U.S. Department
of Transportation

**Federal Aviation
Administration**

# Advisory Circular

**Subject:** HELIPORT DESIGN

**Date:** 1/20/94
**Initiated by:** AAS-110

**AC No:** 150/5390-2A
**Change:**

**1. PURPOSE.** This Advisory Circular (AC) provides recommendations and standards for heliport and helistop design initiated after the date of this AC.

**2. CANCELLATION.** AC 150/5390-2, Heliport Design, dated January 4, 1988, is canceled.

**3. EXECUTIVE SUMMARY.** The modern helicopter is one of the most versatile transportation vehicles known to man. The helicopters ability to operate from minimal real estate has given it the capability of providing a wide variety of important services to any community which integrates the helicopter into its local transportation system.

**a. Service.** In addition to their service in the transportation of people, helicopters have proven to be useful to their communities in the following ways:

**(1) Disaster Relief.** Natural disasters often result in the breakdown of ground transportation systems. Helicopters are able both to bring in response teams and supplies and to evacuate injured people during the critical period before and while ground transportation is being restored.

**(2) Air Ambulance Services.** For an injured or critically ill person, time is life. Only helicopters can provide high speed point-to-point transportation without being constrained by the limitations of the ground infrastructure.

**(3) Police Departments.** Many municipalities consider their police department helicopters vital force multipliers in carrying out search and rescue, chase, and surveillance.

**(4) Moving High Value Assets.** High-value or time-sensitive cargo, such as canceled checks, and people, including the President of the United States, frequently travel on helicopters because this mode of transportation is fast and flexible. Companies use helicopters as an invaluable part of an in-house transportation system to connect the office with various plants, job sites, and the local airport. Utility companies use helicopters to construct and inspect high-voltage electrical lines and to monitor underground gas transmission lines. Newspapers and radio/TV stations use helicopters for on-site news gathering, taking photos, and airborne reporting of rush hour traffic conditions.

**b. Facilities.** The most effective way for a community to realize the benefits of helicopter services is by developing or permitting the development of places where helicopters can land and takeoff. While heliports can be large and elaborate, most are not. In many situations, a wind sock on a grass area with clear approaches is sufficient to provide an effective and safe heliport. This minimal facility may be adequate as a private use heliport, and may even suffice as the initial phase in the development of a public use heliport capable of serving the general aviation segment of the helicopter community.

**c. Planning.** While the heliport itself may be simple, the planning and organization required to properly put one into place can be intimidating. To help make the process easier, the Federal Aviation Administration has published this AC 150/5390-2A, Heliport Design. While the AC is a technical document intended to help engineers, architects, and city planners design, locate, and build the most effective heliport, it can be used by anyone considering the construction of a heliport.

**d. Location.** The optimum location for a heliport is in close proximity to the desired origination and/or destination of the potential users. Industrial, commercial, and business operations in urban locations are demand generators for helicopter services, yet in many cases compete for the limited ground space available. A site permitting the aeronautical and commercial usage to be shared is a viable alternative to non-aeronautical use alone. Heliport sites may be adjacent to a river or a lake, a railroad, a freeway, or a highway, all of which offer the potential for multi-functional land usage. These locations also have the advantage of relatively unobstructed airspace which can be further protected from unwanted encroachment by properly enacted zoning. As vertical lift transportation becomes more and more prevalent, requirements for scheduled "airline type" passenger services will necessitate the development of an instrument procedure to permit "all-weather" service. This requirement may materialize at a few metropolitan heliports.

**e. AC Organization.** The AC is structured to provide communities and or persons intending to develop a heliport, or become involved in regulating helicopter facilities, with general guidance on heliport requirements. The AC is organized to minimize the amount of material that the reader is obligated to digest in order to have an understanding of heliport design based on the functional role the heliport is intended to perform.

**(1)** A heliport proponent should be familiar with the terminology used in this specialized field. Chapter 1 defines pertinent terms used in the industry and identifies actions common to developing a heliport.

**(2)** Private use heliports are usually owned by an individual or corporation who can control heliport usage. Generally, a private use heliport is used by a single pilot or a small number of pilots who are familiar with the heliport and any physical or operational limitations. For this reason, private use heliports can be designed to more flexible standards. Design recommendations relevant to developing a private use heliport are found in chapter 2.

**(3)** Public use general aviation heliports are normally publicly owned although they can be privately owned. As public use facilities, they can be used by any qualified pilot. Therefore, the recommended dimensions and clearances are more demanding than for private use heliports. Design standards relevant to developing a public use general aviation heliport are found in chapter 3.

**(4)** Transport heliports are developed to provide the community with a full range of vertical flight services including scheduled service by air carriers (airlines) using helicopters. When the heliport serves any scheduled or unscheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than 30 passengers, the heliport is required to be certificated by the FAA in accordance with Federal Aviation Regulation (FAR) Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers. In any event, a transport heliport would also accommodate corporate users and local air taxi operators. This broad spectrum of activities frequently requires a more extensive air-side and land-side infrastructure with the potential capability to operate in instrument meteorological conditions. Not withstanding these requirements, a community's investment in a heliport may be substantially less than the investment required for an airport providing comparable services. Design standards relevant to developing a transport heliport are found in chapter 4.

**(5)** Hospital heliports are treated as special cases of private use facilities providing a unique public service. They are normally located in close proximity to the hospital emergency room or a medical facility. Design standards relevant to developing a hospital heliport are found in chapter 5.

**(6)** When there is a significant number of helicopter operations on an airport, it may be prudent to consider developing separate facilities specifically for helicopter use. Chapter 6 addresses helicopter facilities on airports.

**(7)** Currently, when the weather is poor, helicopters tend to use an airport with an instrument landing procedure. Good planning suggests municipalities should plan for the eventual development of instrument approaches to their heliports. Recommendations to be considered in contemplating future instrument operations at a heliport are found in chapters 7 and 8.

**(8)** Chapter 9 addresses heliport gradients and pavement design issues.

**(9)** The appendices provide helicopter dimensional data, dimensional recommendations for heliport markings, and addresses of aviation organizations.

**4. APPLICATION.** The recommendations and standards in this AC are for planning and designing civil heliports. These recommendations and standards are predicated on average conditions, thus may require adaptation to meet the specific conditions of a particular site. To the extent that it is feasible and practical to do so, these standards should be used in planning and designing improvements to an existing heliport when significant expansion or reconstruction is undertaken. Conformity with these standards is prerequisite to Federal grant-in-aid assistance. The recommendation and standards in this AC are not intended to govern either helicopter or heliport operations or be used to design an instrument approach procedure.

LEONARD E. MUDD
Director, Office of Airport Safety and Standards

CONTENTS

# CHAPTER 1. INTRODUCTION

**1. GENERAL.** This chapter defines terms used in this Advisory Circular (AC), and addresses matters of a general nature relating to heliport development.

**2. BASIS.** This AC implements the objective set forth in Section 103 of the Federal Aviation Act of 1958 as amended. That states, in part:

"In the exercise and performance of his power and duties under this Act, the Secretary of Transportation shall consider the following, among other things, as being in the public interest:

**(a)** The regulation of air commerce in such manner as to best promote its development and safety and fulfill the requirements of defense;

**(b)** The promotion, encouragement, and development of civil aeronautics;

**(c)** The control of the use of the navigable airspace of the United States and the regulation of both civil and military operations in such airspace in the interest of the safety and efficiency of both."

This AC recognizes that FAR Part 77, Objects Affecting Navigable Airspace, establishes standards for determining obstructions to navigable airspace and provides for aeronautical studies of such obstructions to determine their effect on the safe and efficient use of airspace. These standards apply to the effect of construction proposals upon a heliport available for public use or a planned or proposed heliport that will be available for public use. The heliport primary surface described in FAR Part 77 coincides in size and shape with the designated takeoff and landing area, i.e., the FATO. The heliport approach and transitional surfaces described in FAR Part 77 are depicted in figure 1-6. Public agencies are encouraged to enact zoning ordinances to prevent man-made features from penetrating these surfaces.

**3. EXPLANATION OF TERMS.** The Pilot/Controller Glossary of the Airman's Information Manual (AIM) defines terms used in the Air Traffic Control system such as instrument flight rules (IFR), and visual flight rules (VFR). Copies of the AIM are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Other terms used in this publication follow:

**a. Approach/Takeoff** Path. The flight track helicopters follow when landing at or taking off from a heliport.

**b. Design Helicopter.** A generic rotorcraft which reflects the maximum weight, overall length, rotor diameter, etc. of all helicopters expected to operate at the heliport.

**c. Emergency Evacuation Facility.** A clear area on a roof of a tall building, that is not intended to function as a heliport, yet is capable of accommodating helicopters engaged in fire fighting and/or emergency evacuation operations.

**d.** Final Approach and Takeoff Area (FATO). A defined area over which the final phase of the approach to a hover, or a landing, is completed and from which the takeoff is initiated. This area was called the "takeoff and landing area" in previous publications.

**e. Final Approach Reference Area (FARA).** A 150 foot (45 m) wide by at least 150 foot (45 m) long obstacle-free area with its center aligned on the final approach course. It is located at the end of a precision instrument FATO.

**f. Hazard to Air Navigation.** Any object having a substantial adverse effect upon the safe and efficient use of the navigable airspace by aircraft or upon the operation of an air navigation facility.

**NOTE:** Obstructions to air navigation are presumed to be hazards to air navigation until an FAA study determines otherwise.

**g. Heliport.** The area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters, together with appurtenant buildings and facilities.

**h. Heliport Elevation.** The elevation, expressed as the distance above mean sea level, of the highest point in the FATO or the FARA.

**i. Heliport Imaginary Surfaces.** The imaginary planes, centered about the FATO and the approach/takeoff path, that identify the objects to be evaluated to determine whether the objects should be removed, lowered, and/or marked and lighted--or the approach/takeoff path realigned.

**j. Heliport Reference Point (HRP).** The geographic position of the heliport expressed as the latitude and longitude at:

**(1)** The center of the FATO, or the centroid of multiple FATOs, for heliports having visual and non-precision instrument approach procedures; or

**(2)** The center of the FARA when the heliport has a precision instrument procedure.

**k. Helistop.** A minimally developed helicopter facility for boarding and discharging passengers or cargo. The heliport--helistop relationship is comparable to a bus terminal--bus stop relationship with respect to the extent of services provided or expected.

**NOTE:** The heliport design recommendations and standards in this AC are equally applicable to helistops.

**l. Hospital Heliport.** A heliport limited to serving helicopters engaged in air ambulance, or other hospital related functions.

**m. Medical Emergency Site.** An unprepared site at or near the scene of an accident or similar medical emergency on which a helicopter may land to pick up a patient in order to provide emergency medical transport.

**NOTE:** A designated helicopter landing area located at a hospital or medical facility is a heliport and not a medical emergency site.

**n. Obstruction.** Any object, including a parked helicopter, exceeding the obstruction standards specified by FAR Part 77, Objects Affecting Navigable Airspace, Subpart C, Obstruction Standards.

**o. Private Use Heliport.** A heliport developed for the exclusive use of the owner and persons authorized by the owner.

**p. Protection Zone.** An area off the end of the FATO and under the approach/takeoff path to enhance the protection of people and property on the ground.

**q. Public Use Heliport.** A heliport available for use by the general public without a requirement for prior approval of the owner or operator.

**(1) General Aviation Heliport.** A heliport intended to accommodate individuals, corporations, and helicopter air taxi operators. Scheduled passenger services may be available.

**(2) Transport Heliport.** A heliport intended to accommodate air carrier operators providing scheduled or unscheduled service with large helicopters.

**r. Safety Area.** A defined area on a heliport surrounding the FATO which is free of objects, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.

**s. Taxi Route.** An obstruction free corridor in which helicopters hover taxi above the surface at airspeeds less than approximately 20 knots.

**t. Taxiway.** A defined path established for the ground taxi of helicopters from one part of a heliport to another.

**u. Touchdown and Liftoff Area (TLOF).** A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off. The TLOF is frequently called a helipad or helideck. This area was called the "FATO" in previous publications.

**4. NOTICE OF HELIPORT DEVELOPMENT.** Except as noted in subparagraph b, FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports, requires any person proposing to construct, activate, or deactivate a heliport to provide the FAA advance notice of their intent. Notice is also required when an existing heliport changes the size/number of FATOs; adds, deletes, or modifies an approach or departure route; or changes its status from private use to public use or public use to private use. States and local governments may have notice requirements that parallel the Federal requirement. Heliport proponents are urged to contact their appropriate state and local governmental offices or transportation departments for their requirements.

**a. Notification Procedures.** Notification is accomplished by forwarding a completed FAA Form 7480-1 (figure 1-1), a location map (figure 1-2), and a layout sketch (figure 1-3) to the appropriate FAA Regional Airports Office. Airspace submissions should be made at least 90 days prior to construction, alteration, or date of changed use begins. Addresses for FAA Regional Airports Offices are on the Form. It is recommended that a 7.5 Minute U.S. Geological Survey (USGS) Quadrangle Map be used for the location map. The sketch should show the heliport layout, all proposed approach (departure) routes, buildings, trees, fences, power lines, etc.

**NOTE:** *(1) In an emergency involving essential public service, public health, public safety, or when the delay arising from the 90 day advance notice requirement would result in an unreasonable hardship, a proponent may provide notice to the appropriate FAA Airport District/Field Office or Regional Office by telephone or other expeditious means as soon as practicable in lieu of submitting FAA Form 7480-1. However, the proponent shall provide full notice, through submission of FAA Form 7480-1, when otherwise requested or required by the FAA.*

*(2) The latitude and longitude of the proposed heliport should be stated in North American Datum of 1983 (NAD-83) coordinates. If another datum series is used, that fact should be noted in the submission.*

**b. Notice Exemptions.** Paragraph 157.1, Applicability, of FAR Part 157 exempts heliports meeting the conditions under (1), (2), and (3) below from the requirement to submit notice. However, these exemptions do not negate a notice or formal approval requirement prescribed by state law or local ordinance.

***(1)*** *Any heliport subject to conditions of a Federal agreement that requires an approved current layout plan to be on file with the FAA.*

***(2)*** *A heliport at which flight operations will be conducted under visual flight rules (VFR) and which is used or intended to be used for a period of less than 30 consecutive days with no more than 10 operations per day.*

***(3)*** *The intermittent use of a site that is not an established airport, which is used or intended to be used for less than one year and at which flight operations will be conducted only under VFR. For the purpose of this part, "intermittent use of a site" means: (1) the site is used or is intended to be used for no more than 3 days in any one week; and (2) no more than 10 operations will be conducted in any one day at that site."*

**NOTE:** For the purposes of applying the FAR Part 157 exemption criteria cited in (2) and (3) above, a landing and associated takeoff is considered to be one operation.

**c. FAA Action.** The FAA evaluates the proposed heliport for its impact upon the safe and efficient use of navigable airspace; for its impact upon the operation of air navigation facilities; and for its effect on the safety of persons and property on the ground. The proponent is advised of the FAA findings.

**d. Notice Benefits.** In order for the FAA to study the impact of off-site construction (Refer to paragraph 7) upon a heliport available for public use, it is essential that the heliport's latitude and longitude, elevation, and the direction and type of approach and departure be on record with the FAA.

**5. MEDICAL EMERGENCY SITES.** Medical emergency sites are clear and level areas at or near the scene of an accident or incident that have been selected or designated by the local emergency response team as the place where the helicopter air ambulance is directed to land in order to transport an injured person to a hospital.

**a. Notice.** Because of their transitory nature, medical emergency sites are not heliports and submission of FAA Form 7480-1 is not required. Proponents of predesignated emergency landing sites should coordinate their emergency plan with the local airport traffic control tower (ATCT). This coordination is especially important if a site(s) may be used under conditions of low visibility and/or use of the site(s) would require ATC clearance.

**b. Marking/Lighting.** Depending upon the level of training of the local accident or emergency response teams and agreements worked out with the local air ambulance operators, medical emergency landing sites may be identified with flags, markers, lights, flares, etc.

**c. Landing Discretion.** All landings at a medical emergency site are made at the pilot's discretion after weighing the urgency for air transport against the performance capability of the helicopter, his or her piloting ability and experience, and the limitations and/or constraints of the site.

**6. EMERGENCY EVACUATION FACILITIES.** To facilitate fire fighting or emergency evacuation operations, local building codes may require structures over a specified height to provide a clear area on the roof capable of accommodating a helicopter. Since the cleared area is not intended to function as a heliport, there is no requirement to submit an FAA Form 7480-1. As in the case of medical emergency sites, proponents of emergency evacuation facilities should advise the local ATCT of the facility. The landing surface should be developed to the local fire department requirements based on the size and weight of the helicopter(s) expected to engage in fire or rescue operations. The following markings are recommended to identify the limits of the landing area and to alert the pilot to any weight limitation. Markings should be in a color (red or orange is suggested) that provides the greatest possible contrast to the roof coloration.

**a. Edge Marking.** A 12 inch (30 cm) wide line defines the limits of the intended landing surface. It is recommended that the edge marking provide at least 10 feet (3 m) of clearance to any object that could be struck by a helicopter's main or tail rotor.

**b. Weight Limitation.** Any limitation on allowable weight should be placed in the center of the circle as viewed from the preferred direction of approach. Weight limitations should be stated in units of 1,000 pound as illustrated in figure 1-4. To assure early recognition of a weight limit it is suggested that the numeral(s) be a minimum of 3 feet (0.9 m) in height. A bar may be placed under the number to minimize the possibility of being misread.

**7. NOTICE OF PROPOSED CONSTRUCTION.** FAR Part 77 requires the FAA be notified of certain proposed construction or alteration of a structure or object. It also specifies standards for determining obstructions to air navigation and provides for FAA aeronautical studies of obstructions to determine their effect on the safe and efficient use of airspace.

**a. Notice.** Proposed construction or alteration of structures or objects in the vicinity of a public use heliport requiring notice to the FAA include those which are:

**(1)** more than 200 feet AGL or

**(2)** less than 200 feet AGL and;

**(a)** are located within 5,000 feet (1 500 m) of a public use or military heliport and penetrate a 25:1 sloping surface originating at the heliport as illustrated in figure 1-5, or

**(b)** the FAA requests notice.

**b. FAA Aeronautical Study.** Information on the FAA's role in conducting an aeronautical study of off heliport construction is found in AC 70/7460-2, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace. The FAA also may choose to study a proposed structure that the FAA believes may pose a hazard to navigation. In most cases, wires and their supporting structures fall into this discretionary category of structures less than 200 feet AGL.

**c. Determination.** The FAA summarizes the findings of an aeronautical study in a determination of hazard or no hazard that is issued to the sponsor. An FAA determination discusses the aeronautical impact of the proposed construction or alteration on the use of navigable airspace. The FAA does not have authority to approve or disapprove the construction of a proposed structure that would be a possible hazard to air navigation, but FAA's recommendations on the subject are not easily dismissed by project sponsors because of potential liability.

**(1)** An FAA marking-and-lighting recommendation may be incorporated into a determination of no hazard and, if included, is considered to be a condition to that determination.

**(2)** The FAA also provides copies of determinations to state and local aviation agencies and airport authorities.

**(3)** When the study involves a proposal for which a Federal Communications Commission (FCC) construction permit is required, then the FAA provides the FCC with a copy of the determination.

**8. FAA STUDY OF EXISTING OBJECTS.** Existing objects that are obstructions to air navigation are presumed to be hazards until an FAA study determines otherwise.

**a. FAA Study.** Aeronautical studies of existing objects are conducted when deemed necessary by the FAA to determine the physical and electromagnetic effect on the use of navigable airspace and air navigational facilities. Aeronautical studies of existing objects may be initiated as a result of information received or a situation observed.

**b. Mitigating Adverse Effects.** The adverse effect of an object presumed or determined to be a hazard to air navigation may be mitigated by:

**(1)** Removing the object, if practical;

**(2)** Marking and/or lighting the object, provided an FAA aeronautical study has determined that the object would not be a hazard to air navigation if it were marked and lighted;

**(3)** Realigning the approach/takeoff path to avoid the object; or

**(4)** Modification of operations.

**9. FEDERAL ASSISTANCE.** The FAA administers a grant program that provides financial assistance to eligible sponsors to develop a public use heliport. Information on Federal-aid program eligibility requirements is available in FAA Regional and District Airports Offices. Addresses of Regional offices are listed in Appendix 3. AC 150/5000-3, Address List for Regional Airports Divisions and Airports District/Field Offices, lists all addresses.

**10. ENVIRONMENTAL ASSESSMENTS.** The National Environmental Policy Act of 1969 requires an environmental assessment be made prior to undertaking certain Federal actions relating to heliport development. Actions which may require an environmental assessment are normally associated with Federal grants or heliport layout plan approvals leading to the construction of a new heliport or significant expansion of an existing heliport.

**a. Assessment Items.** An environmental assessment must address noise, land usage, water and air quality, socio-economic issues, and viable alternatives to the proposed development, etc. It must also describe the action taken to ensure public involvement and citizen participation in the planning process. An opportunity for a public hearing may be required for a federally funded development of, or significant improvement to, an existing heliport.

**b. Guidance.** FAA Order 5050.4A, Airport Environmental Handbook, and Order 1050.1, Policies and Procedures for Considering Environmental Impacts, provide guidance on environmental assessments. State and local governments should be contacted directly as they may also require an environmental report. The procedures in AC 150/5020-1, Noise Control and Compatibility Planning for Airports, describe a means of assessing the noise impact for airports which can be used in conjunction with the Heliport Noise Model (HNM) for assessing noise impact. The HNM is available from the FAA Office of Environment and Energy. Proponents of non-federally assisted heliports are encouraged to work closely with local governmental authorities concerning environmental issues.

**c. Turbulence.** Air flowing around and over buildings, stands of trees, terrain irregularities, etc. can create turbulence which may affect helicopter operations. A report, Evaluating Wind Flow Around Buildings on Heliport Placement. addresses winds effect on helicopter operations. A copy of the report (Accession number is AD-A153512) is available from the National Technical Information Service, Springfield, Virginia 22161. The following actions may be taken in selecting a site to minimize the effects of turbulence.

**(1) Ground Level Heliports.** Helicopter operations from sites immediately adjacent to buildings, trees, etc. are subjected to air turbulence effects caused by such features. Therefore, locate the landing and takeoff area as far from nearby buildings, trees, or significant terrain features as the site permits.

**(2) Elevated Heliports.** Elevating heliports 6 feet (1.8 m) or more above the level of the roof will generally minimize the turbulent effect of air flowing over the roof edge. While elevating the platform helps reduce or eliminate the air turbulence effects, a safety net/shelf may be required.

**11. STATE ROLE.** Many state departments of transportation, aeronautical commissions, or similar authorities, require prior approval, and in some instances a license, for the establishment and operation of a heliport. Several states administer a financial assistance program similar to the Federal program and are staffed to provide technical advice. Heliport proponents are encouraged to contact their respective state aeronautics commissions or departments for particulars on licensing and assistance programs. Appendix 3 lists addresses for state aviation offices.

**12. LOCAL ROLE.** Some communities have enacted zoning laws, building codes, fire regulations, etc. that can impact heliport establishment and operation. Some have or are in the process of developing codes or ordinances regulating environmental issues such as noise and air pollution. A few localities have enacted specific rules governing the establishment of a heliport. Therefore, heliport proponents are encouraged to make early contact with officials or agencies representing the local zoning board, the fire, police, or sheriff's department, and the elected person(s) who represent the area where the heliport is to be located.

U.S. Department of Transportation
Federal Aviation Administration

**NOTICE OF LANDING AREA PROPOSAL**

| Name of Proponent, Individual or Organization | Address of Proponent, Individual or Organization (No., Street, City, State, Zip Code) |
|---|---|
| J. BURKE Company<br>☑ Check if the property owner's name and address are different than above, and list property owner's name and address on the reverse. | 300 Duke Street<br>Alexandria, Virginia 23003 |

☑ Establishment or Activation ☐ Deactivation or Abandonment ☐ Alteration ☐ Change of Status } OF ☐ Airport ☐ Ultralight Flightpark ☐ Vertiport ☑ Heliport ☐ Seaplane Base ☐ Other (Specify)

**A. Location of Landing Area**

| 1. Associated City/State | 2. County/State (Physical Location of Airport) | 3. Distance and Direction From Associated City or Town | |
|---|---|---|---|
| Alexandria, Virginia | Not applicable | | |
| 4. Name of Landing Area | 5. Latitude / 6. Longitude / 7. Elevation | Miles | Direction |
| Heli-Alex | 38 ° 48 ' 06 " / 77 ° 03 ' 10 " / 10 feet | 1.5 | WSW |

**B. Purpose**

| Type Use | If Change of Status or Alteration, Describe Change | | Construction Dates: To Begin/Began | Est. Completion |
|---|---|---|---|---|
| ☑ Public<br>☐ Private<br>☐ Private Use of Public Lands/Waters | | ☐ Establishment or change to traffic pattern (Describe on reverse) | Oct. '93 | Mar '94 |

**C. Other Landing Areas** (Ref. As Above)

| Name | Direction From Landing Area | Distance From Landing Area |
|---|---|---|
| National Airport | NNE | 3.5 |
| Andrews AFB | E | 10 |

**D. Landing Area Data**

| | | Existing (if any): Rwy #1 | Rwy #2 | Rwy #3 | Proposed: Rwy | Rwy | Rwy |
|---|---|---|---|---|---|---|---|
| 1. Airport, Seaplane Base, or Flightpark | Magnetic Bearing of Runway(s) or Sealane(s) | | | | | | |
| | Length of Runway(s) or Sealane(s) in Feet | | | | | | |
| | Width of Runway(s) or Sealane(s) in Feet | | | | | | |
| | Type of Runway Surface (Concrete, Asphalt, Turf, Etc.) | | | | | | |
| 2. Heliport | Dimensions of Final Approach and Take-off Area (FATO) in Feet | | | | 100 x 200 | | |
| | Dimensions of Touchdown and Lift-Off Area (TLOF) in Feet | | | | 50 x 50 | | |
| | Magnetic Direction of Ingress/Egress Routes | | | | 103/306 | | |
| | Type of Surface (Turf, concrete, rooftop, etc.) | | | | Concrete | | |
| 3. All | Description of Lighting (if any): -Edge & Landing Direction | | | | Direction of Prevailing Wind: Northerly | | |

**E. Obstructions**

| Type | Height Above Landing Area | Direction From Landing Area | Distance From Landing Area |
|---|---|---|---|
| Masonic Temple | 430 | NNE | 0.5 |
| Radio Tower | 200 | NE | 0.3 |
| Hi-Rise Apartments | 150 | SE | 0.6 |
| Marked Power Line | 75 | S | 0.05 |
| Office Buildings | 120 | NNW | 0.1 |

**F. Operational Data**

1. Estimated or Actual Number Based Aircraft

| Airport, Flightpark, Seaplane base | Present (If est. indicate by letter "E") | Anticipated 5 Years Hence | Heliport | Present (If est. indicate by letter "E") | Anticipated 5 Years Hence |
|---|---|---|---|---|---|
| Multi-Engine | | | Under 3,500 lbs. MGW | 0 | 2 |
| Single-engine | | | Over 3,500 lbs. MGW | 0 | 5 |
| Other | | | | | |

2. Average Number Monthly Landings

| | Present (If est. indicate by letter "E") | Anticipated 5 Years Hence | | Present (If est. indicate by letter "E") | Anticipated 5 Years Hence |
|---|---|---|---|---|---|
| Jet | | | Helicopter | 20 E | 50 |
| Turboprop | | | Ultralight | | |
| Prop | | | Other | | |

3. Are IFR Procedures For The Airport Anticipated: ☑ No ☐ Yes Within ______ Years Type Navaid

**G. Other Considerations**

| Identification | Direction From Landing Area | Distance From Landing Area |
|---|---|---|
| Maury Sch | N | 0.9 |
| Jefferson-Houston Sch | NNE | 0.8 |
| Robert E Lee Sch | E | 0.84 |
| Cameron Sch | W | 0.94 |
| Stonewall Jackson Sch | NNW | 0.9 |
| Bishop Ireton High Sch | NW | 0.7 |
| Residences (all directions) | | 0.3 |

**H. Application for Airport Licensing**

☑ Has Been Made ☐ Will Be Made ☐ Not Required ☑ State ☐ County ☐ Municipal Authority

**I. CERTIFICATION.** *I hereby certify that all of the above statements made by me are true and complete to the best of my knowledge.*

| Name, title (and address if different than above) of person filing this notice—type or print | Signature (in ink) |
|---|---|
| | Jack H Burke |
| | Date of Signature: April 1, 1993 — Telephone No. (Precede with area code): 202-267-8763 |

FAA Form 7480-1 (4-89) Supersedes Previous Edition

**Figure 1-1. Example of required notice**

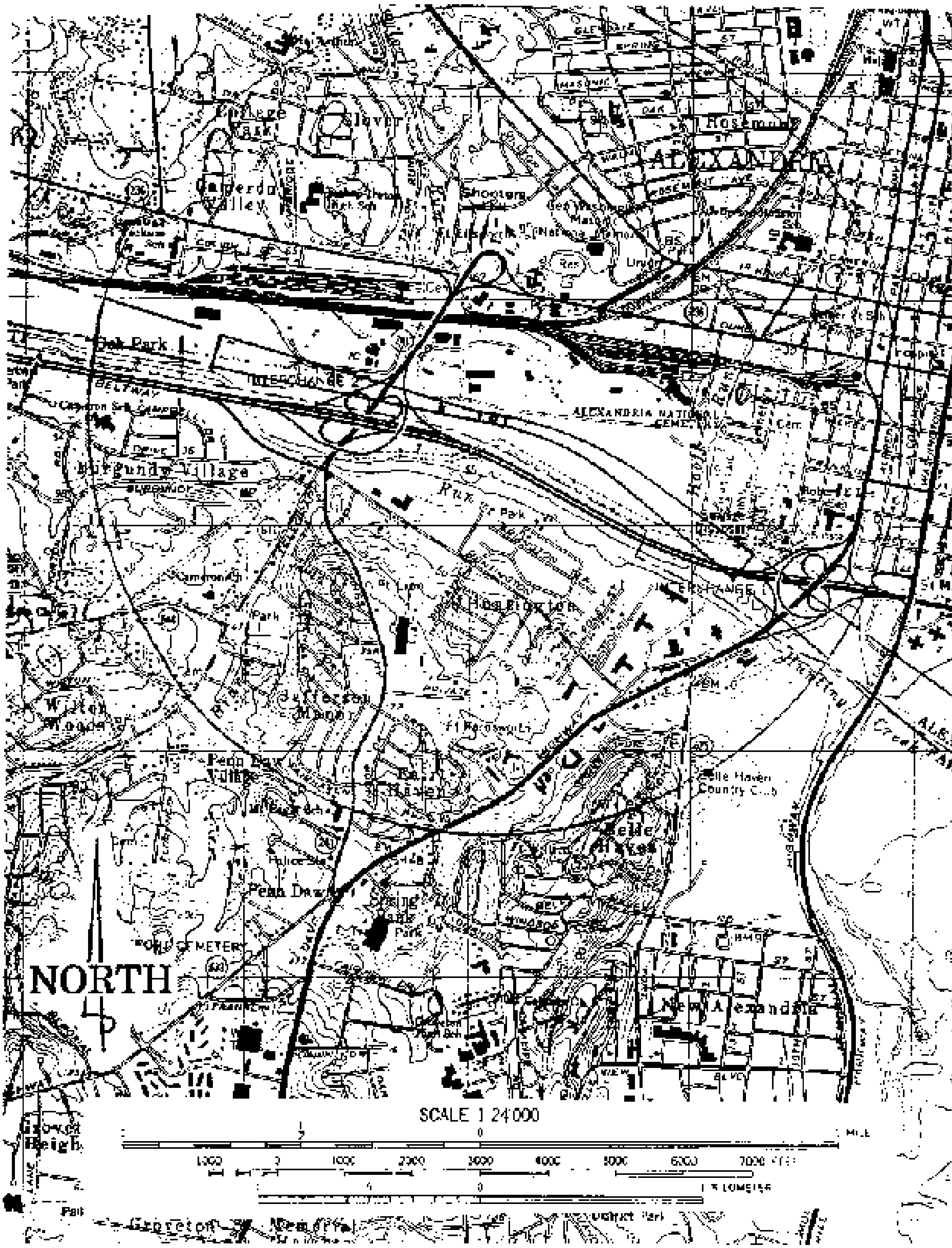



Figure 1-2. Example of a heliport location map

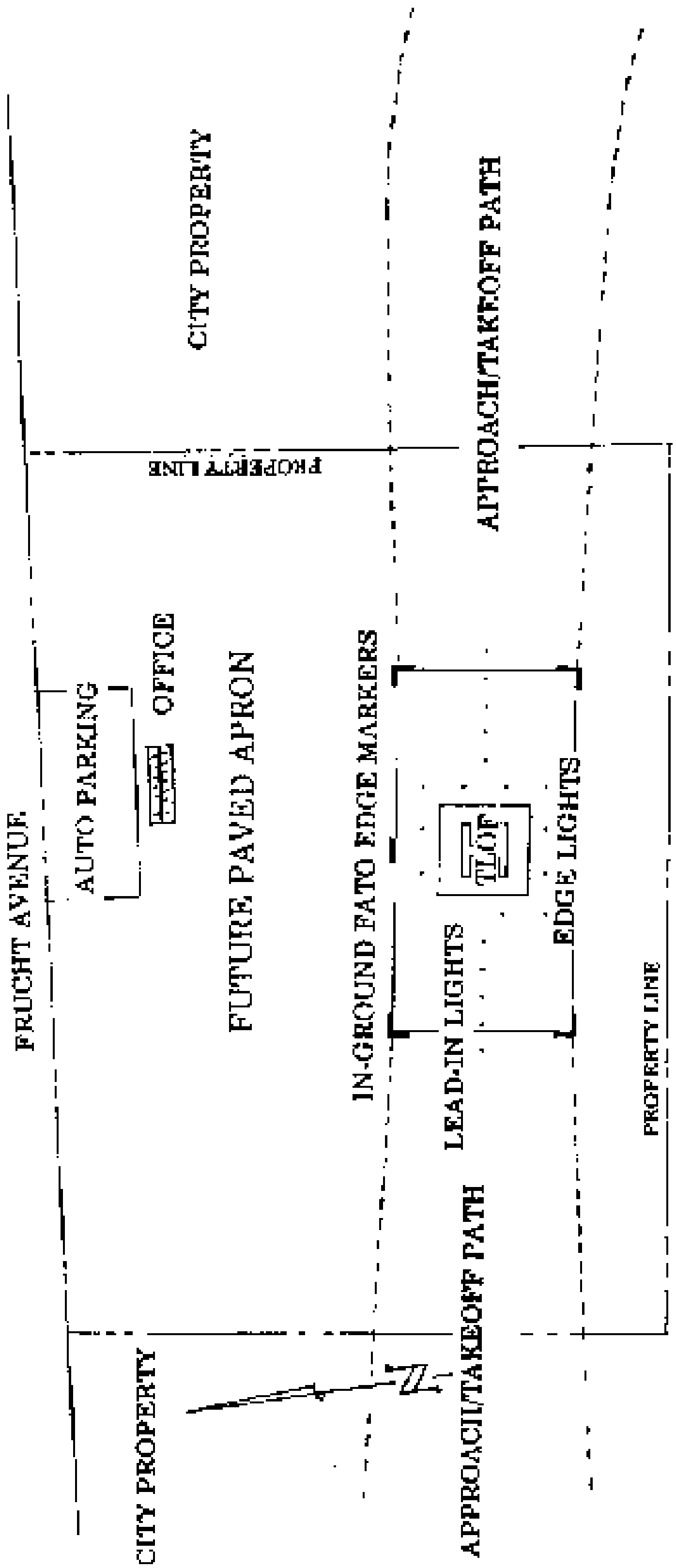



Figure 1-3. Example of a heliport layout sketch

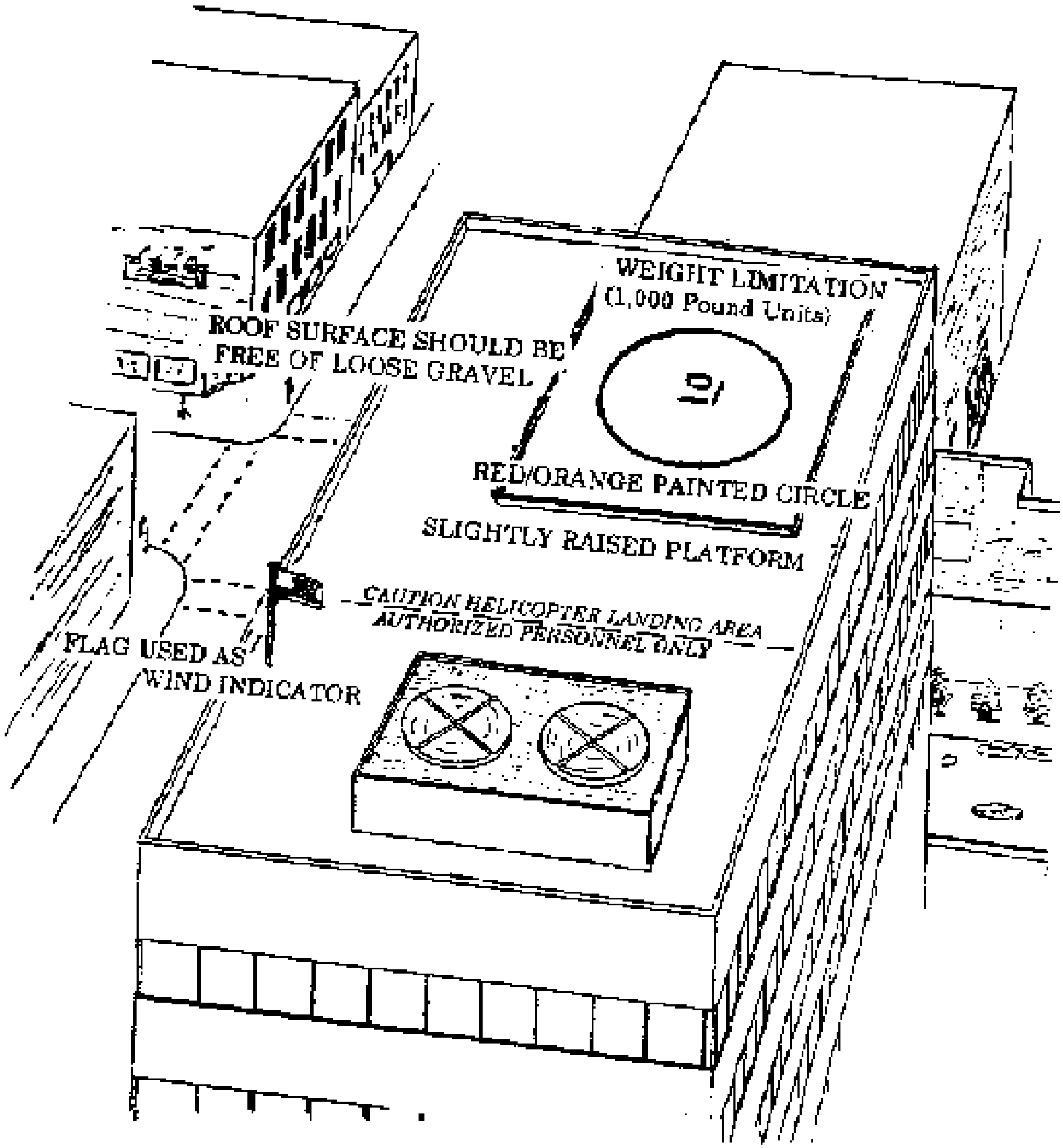



Figure 1-4. Emergency evacuation facility

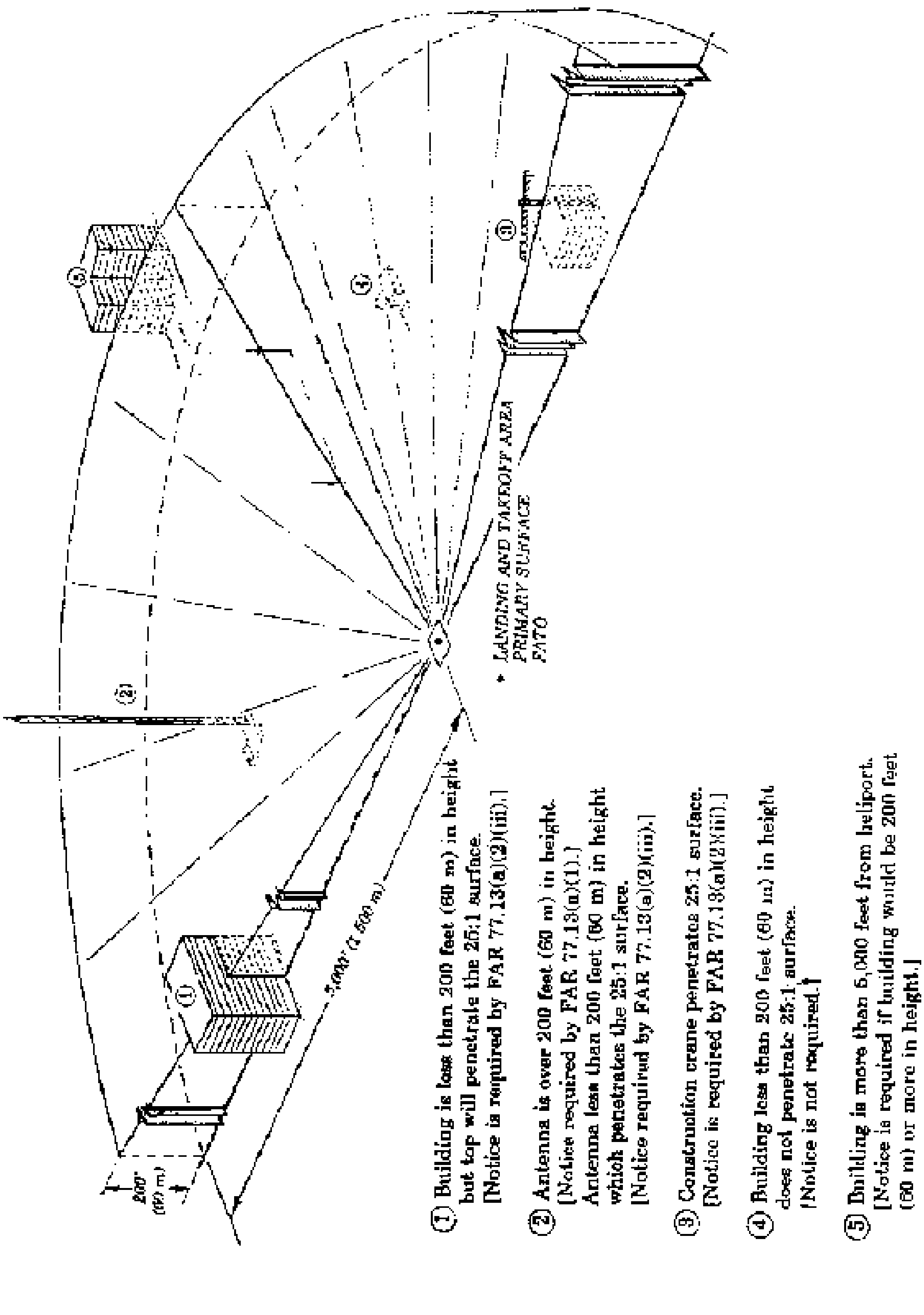



Figure 1-5. Off site development requiring notice

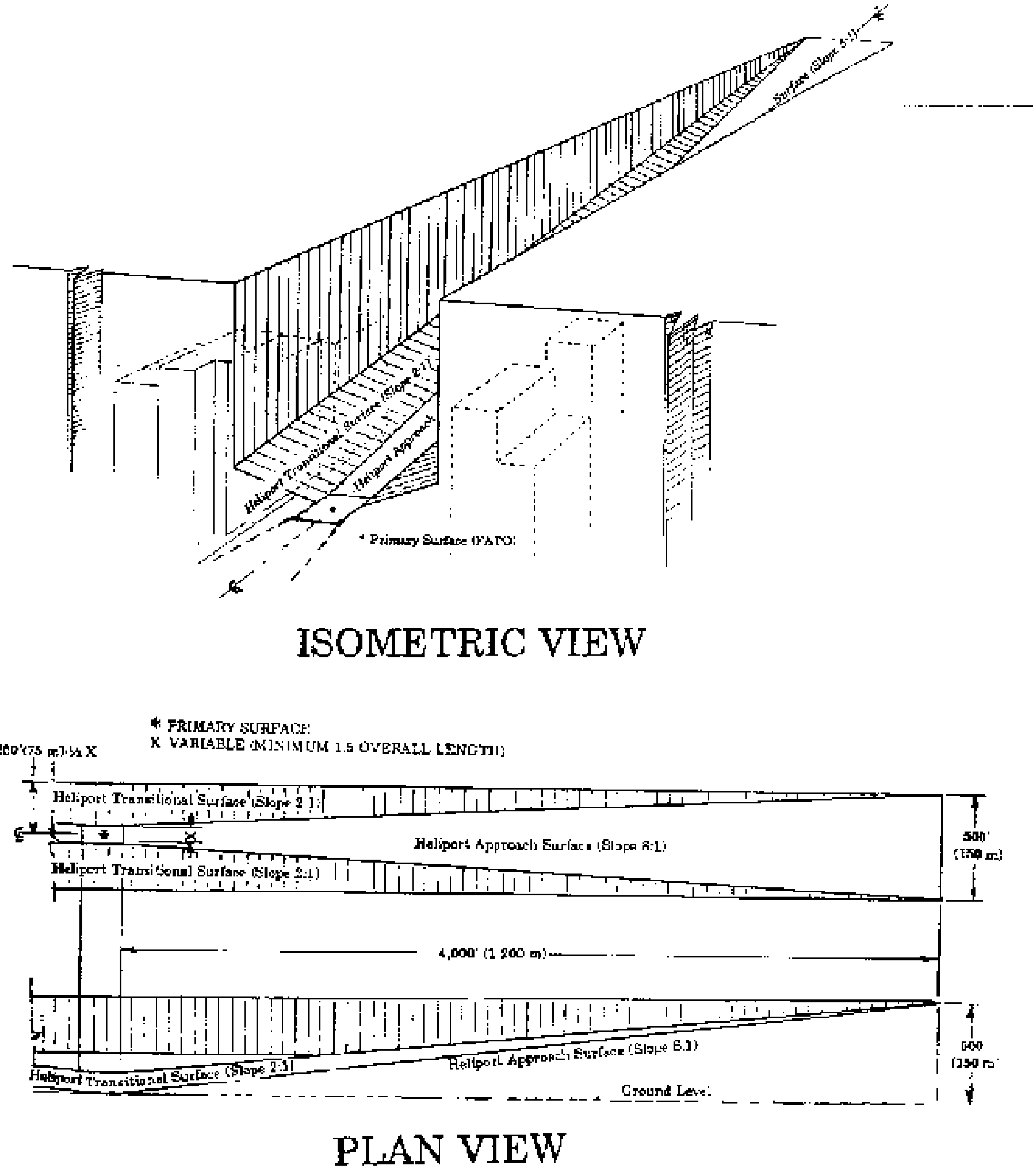



Figure 1-6. Obstruction identification surfaces for visual operations

# CHAPTER 2. PRIVATE USE HELIPORTS

**13. GENERAL.** Helicopters are routinely used for public services such as news gathering, traffic reports, and law enforcement. Numerous firms transport oil field workers from their on-shore heliports to offshore oil platforms saving hours of transit time over ship-based transportation systems. Companies have found the helicopter to be an efficient and effective way to transport people and products between headquarters offices and suburban manufacturing plants, to remote or inaccessible field/mine sites, as well as a convenient shuttle to/from the local airport. To save time and avoid the congestion on streets and highways, an increasing numbers of helicopter owners are finding the helicopter to be a convenient way of commuting between their homes and their places of business. With this diverse usage, private use heliports can vary considerably in both size and complexity. This chapter contains recommendations for designing a heliport intended to be used as a private use facility. Figure 2-1 identifies the essential features of a private use heliport while figure 2-2 depicts an extremely large private use heliport.

**14. FINAL APPROACH AND TAKEOFF AREA (FATO).** A private use heliport should have an identifiable, object free area (FATO) available for helicopter landings and takeoffs.

**a. Location.** A FATO may be at ground or water level, or at pier or roof top level. Objects or structures should be outside the FATO to permit at least one clear approach/takeoff path aligned with the prevailing winds. Figure 2-1 illustrates this recommendation. Heliports located on raised platforms, piers and docks, or buildings may have outer portions of the FATO extend beyond the platform, pier, dock, or building edge as illustrated in figure 2-4.

**b. Size.** A FATO may have any shape provided that its least dimension, i.e., length, width, or diameter, is not less than 1.5 times the overall length of the design helicopter.

**c. Gradients.** When a TLOF is not provided, the FATO should be graded to provide a smooth surface. To assure drainage, a 0.5 to 2 percent gradient is suggested for any part of a FATO surface on which a helicopter is expected to land.

**15. SAFETY AREA.** A safety area surrounds the FATO. Its recommended width is 1/3 rotor diameter of the design helicopter, but not less than 10 feet (3 m). The FATO and the safety area should be free of objects such as other helicopters, buildings, fences, parapets, etc., which could be struck by the main or tail rotor, or be hit by the skids of a helicopter while landing or taking- off.

**16. TOUCHDOWN AND LIFT-OFF AREA (TLOF).** When the entire FATO is not load bearing, a paved or an aggregate-turf TLOF is recommended.

**a. Location.** When a TLOF is provided, it is normally centered within the FATO. For irregularly shaped or oversized FATOs, the center of the paved or aggregate-turf TLOF should be located at least 3/4 of the design helicopter's overall length in from the FATO boundaries. Figure 2-3 illustrates the recommended FATO/TLOF relationship. To the extent practical, the TLOF of a roof top heliport should be elevated above the level of any obstacle in the FATO.

**b. Size.** The least dimension of a TLOF should be a minimum of 1.5 times the length or width of the undercarriage of the design helicopter, whichever is greater.

**c. Surface Characteristics.** If a surface more durable than aggregate-turf is needed, Portland Cement Concrete (PCC) pavement is suggested. An asphaltic surface is "less desirable" for heliports as it may rut under the wheels or skids of a parked helicopter, a possible factor in some roll-over incidents. Pavements should have a broomed or other roughened finish that provides a skid resistant surface for helicopters and non- slippery footing for persons. Pavements should be designed to support 1.5 times the maximum takeoff weight of the design helicopter. Roof top heliport TLOFs may be constructed of wood, metal, or concrete.

**d. Elevated TLOFs.** Roof top heliport TLOFs may be constructed of wood, metal, or concrete. Elevator penthouses, cooling towers, exhaust/fresh air vents, and other raised features impact roof top helicopter operations. To the extent practical, the TLOF of a roof top heliport should be elevated above the level of any obstacle in the FATO. Other objects or structures should be outside the FATO to permit at least one clear approach/takeoff path aligned with the prevailing winds. Figure 2-4 illustrates this recommendation. Elevated platforms should be designed to support 1.5 times the maximum takeoff weight of the design helicopter. When the TLOF is on a platform elevated more than 30 inches

(75 cm) above its surroundings, a 5 foot (1.5 m) wide safety net or shelf should be provided. The safety net or shelf should have a load carrying capability of 25 pounds per square foot (122 Kg per sq. m). The net or shelf, as illustrated in figure 2-4, should not project more than 2 inches (5 cm) above the level of the TLOF. A report, Structural Design Guidelines for Heliports, (Report Number AD-A148967) is available from the National Technical Information Service, Springfield, VA 22161.

**e. Gradients**. To assure drainage, TLOF gradients should range between 0.5 to 2.0 percent.

**17. APPROACH/TAKEOFF SURFACE.**

**a. Approach/Takeoff Path.** A private use heliport must have at least one approach/takeoff path. This path, to the extent practical, should be aligned with the dominate winds. Additional approach/takeoff paths are recommended. Approach/takeoff paths may curve to avoid objects and/or noise sensitive areas and utilize the airspace above public lands, e.g., freeways, rivers, etc.

**b. Approach/Takeoff Surface.** An approach/ takeoff surface is centered on each approach/takeoff path and should conform to the dimensions of the FAR Part 77 heliport approach surface. Figure 1-6 illustrates the FAR Part 77 approach surface which should be free of object penetrations.

**18. HELICOPTER PARKING.** A separate helicopter parking area is not required unless the heliport must accommodate more than one helicopter at a time. Parked helicopters should not penetrate an approach/takeoff surface or be parked within the safety area. While parking areas need not be paved, figure 2-2 depicts a large private use heliport with a number of paved parking pads. Figure 2-5 illustrates a simple parking apron with details of recessed eyes/loops permitting helicopters to be tied down.

**19. HELIPORT MARKERS AND MARKINGS.** Markers and/or surface markings are suggested to identify the facility as a heliport, the perimeters of the FATO and/or TLOF, and, if needed, the operational limitations on weight. Lines used as surface markings may be paint or preformed material.

**a. Perimeter Markings.** In-ground or surface markings may be used to define either, or both, the FATO and TLOF.

**(1) Unpaved Surfaces.** The perimeter of a turf FATO should be identified with in-ground markers that will not catch helicopter skids or create barriers to helicopter maneuvering. If raised markers are used, they should be located at the outer edge of the safety area and no more than 8 inches (20 cm) in height. Markers are placed at the corners, and as needed along the edges of the FATO. Figure 2-6 illustrates different types of in- ground and raised markers.

**(2) Paved Surfaces.** A 12 inch (30 cm) wide dashed line, as illustrated in figures 2-5 and 2-7, defines the limits of the FATO when the entire surface is paved. A 12 inch (30 cm) wide solid line is used to define the limits of a TLOF. While white is the color most commonly used, any color which provides good contrast to the background, may be used.

**b. Identification Marking.** A distinctive marking, such as the company logo, serves to identify the facility as a private use heliport. The identification marking should be placed at the preferred touchdown location, be as large as practical and be oriented to be legible from the preferred direction of approach. The marking should be at least 10 feet (3 m) in height. The capital H illustrated in Appendix 2 may be used in lieu of a logo.

**c. Weight Limitations.** Surfaces which are limited in weight-carrying ability should be marked with a number, in thousands of pounds. The marking should be large enough to be legible from the approaching helicopter. The number is located to the right and below the heliport symbol as viewed from the preferred directions of approach.

**d. Closed Heliport.** All markings on a permanently closed heliport should be obliterated. When obliteration is impractical, a yellow X should be placed over the markings. The X marking, as illustrated in figure 2-8, must be large enough to ensure pilot recognition from 1/4 mile (400 m).

**e. Parking Apron.** If a parking apron is provided, it is recommended that it be designed and marked utilizing the guidance in paragraphs 30 and 31.

**20. HELIPORT LIGHTING.** When night operations are intended and ambient lighting is inadequate, it is recommended that the perimeter of the FATO or TLOF (but not both) be defined with yellow lights. Alternatively, floodlights may be used to illuminate the heliport's FATO or TLOF surfaces. Figures 2-9 and 2-10 illustrate the recommended perimeter lighting systems.

**a. Perimeter Lights.** At least 3 uniformly spaced lights are recommended per side of a square or rectangular FATO or TLOF with a light located at each corner. A minimum of eight lights are needed to define a circular FATO or TLOF. The interval between lights should not exceed 25 feet (7.5 m).

**(1) FATOs.** Flush lights may be located on, or within 1 foot (30 cm) of, the FATO edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, should be located 10 feet (3 m) out from the edge of the FATO.

**(2) TLOFs.** Flush lights may be located on, or within 1 foot (30 cm) of, the TLOF edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, may be located 10 feet (3 m) out from the TLOF edge and should not penetrate a horizontal plane at the TLOF's elevation by more than 2 inches (5 cm).

**(3) Raised TLOFs.** Flush lights should be within 1 foot (30 cm) of the edge of a raised TLOF. Raised fixtures should be within 1 foot (30 cm) of the TLOF edge and should not project more than 2 inches (5 cm) above the TOLF as illustration in figure 2-10. In snow areas, it is suggested that the lights be placed along the outer edge of the safety net or shelf.

**b. Floodlights.** When floodlighting is used, care should be taken to place floodlights clear of the safety area and the approach/takeoff surface(s). Floodlights should be aimed down so as not to interfere with pilot vision and provide a minimum of 3 foot candles (32 lux) of illumination over the FATO or TLOF surfaces. To eliminate the need for tall poles, floodlights may be mounted on adjacent buildings. Floodlights which might interfere with pilot vision during takeoff and landings must be capable of being turned off during landings and takeoffs.

**21. WIND DIRECTION INDICATOR.** A private use heliport must have at least one wind indicator. A wind sock is the preferred indicator as it shows both the direction and magnitude of the wind. The wind sock should be placed where it provides a true indication of surface wind and is clear of the safety area and any approach/takeoff surface. The wind sock may be internally or externally lighted for night operations, or, alternatively be located in an illuminated area.

**22. HELIPORT SAFETY AND SECURITY.**

a. Safety. Provisions should be made to prevent any spilled fuel from collecting in a confined location and/or contaminating a waterway. National Fire Protection Association pamphlets provide guidance on fuel handling and storage.

**b. Security.** The operational areas of a heliport need to be kept free of people, animals, and vehicles. The method to be used to control access depends upon the heliport location and type of potential intruder. In urban areas, a curb will normally keep vehicles from entering while in rural areas cattle guards or fences will prevent the entry of animals. Generally, people will not enter a fenced area. In all cases where a fence is used, it should be as low as possible and at the greatest possible distance from the safety area and not penetrate any approach/takeoff surface. A visible reminder such as a sign, a low trimmed hedge, or flower bed may suffice to alert people to the heliport presence where access to the heliport owners property is already controlled.

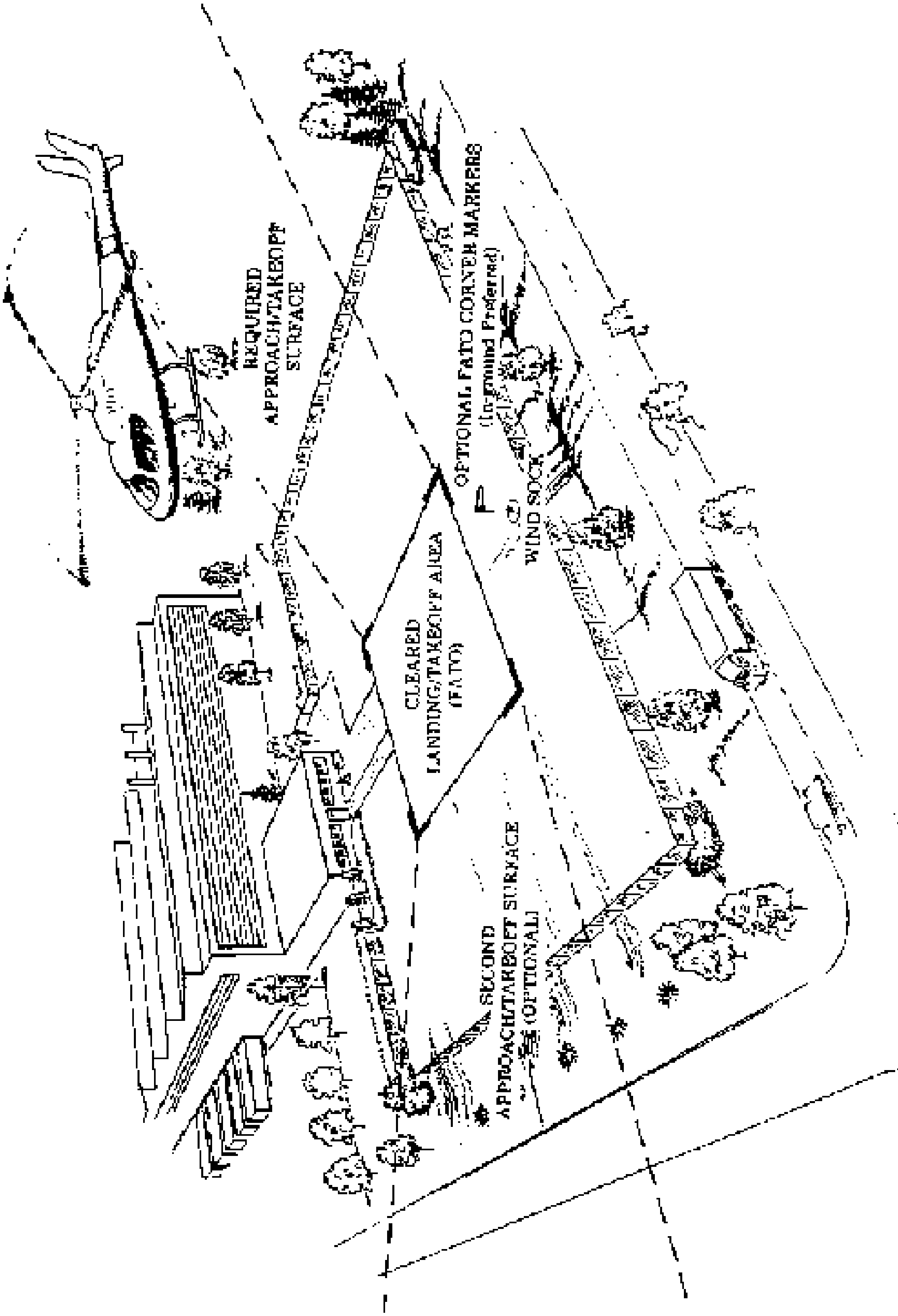



Figure 2-1. Essential features of a private use heliport

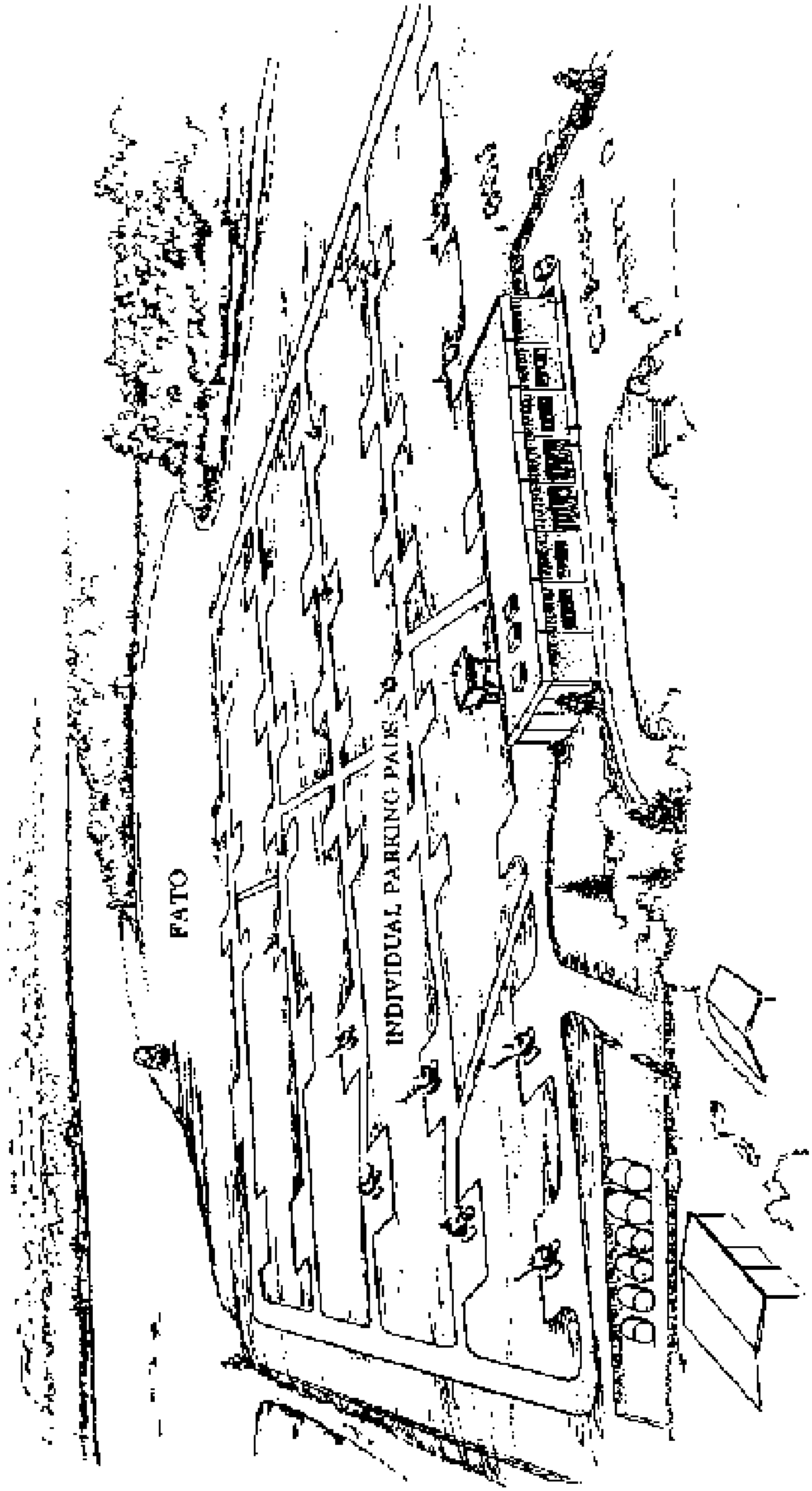



Figure 2-2. A large private use heliport

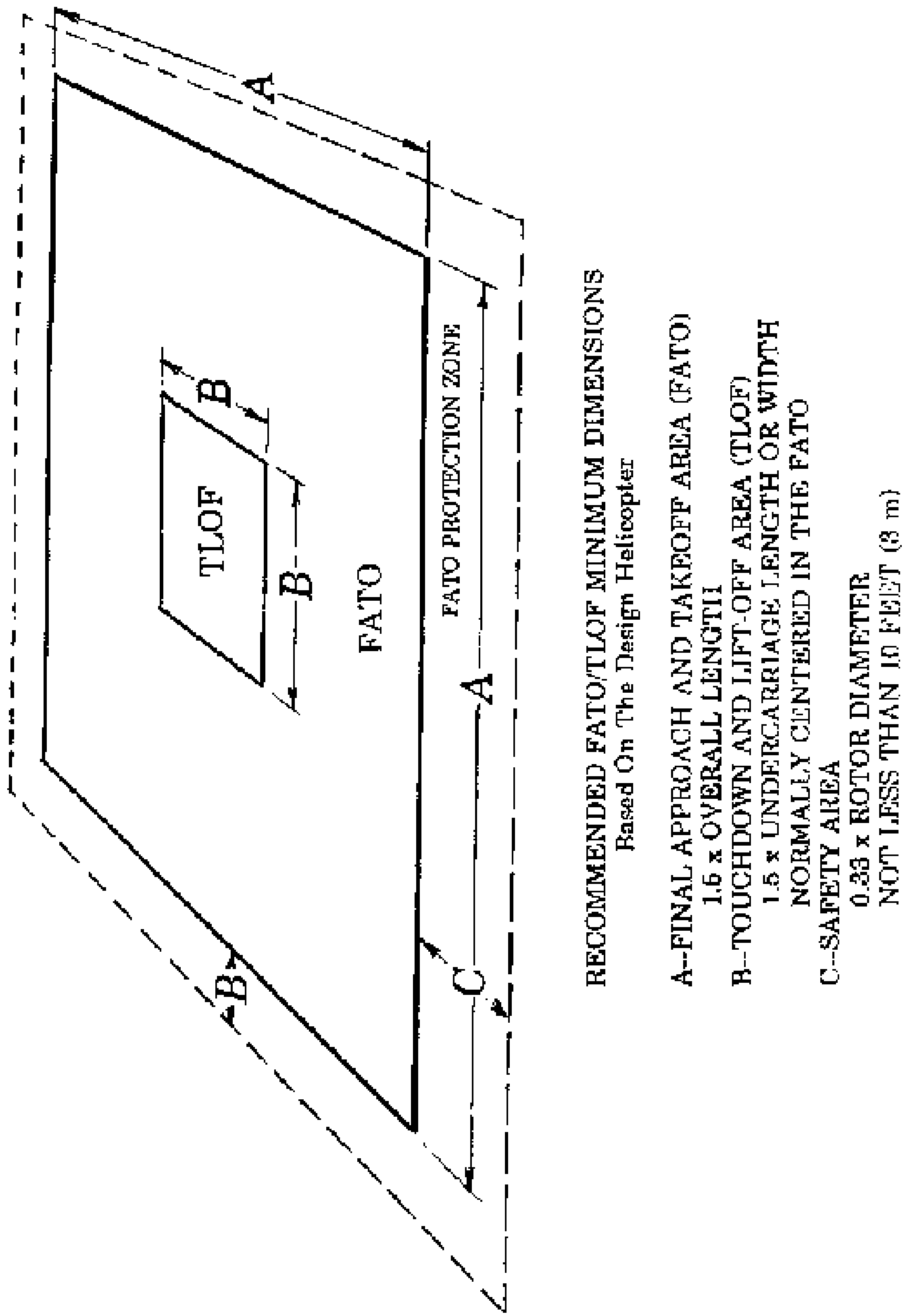



Figure 2-3. FATO/TLOF relationship

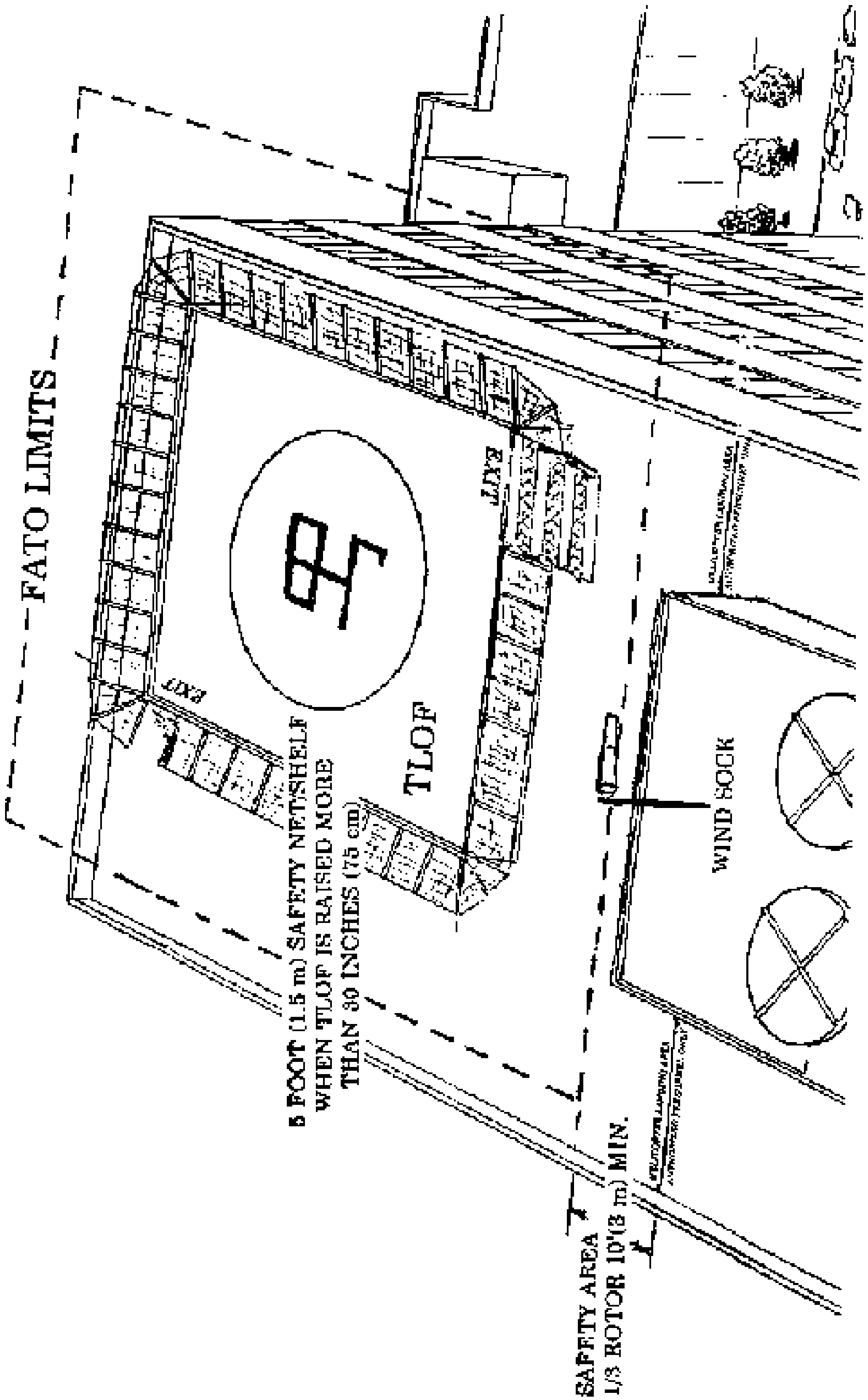



Figure 2-4. Elevated TLOF and safety net

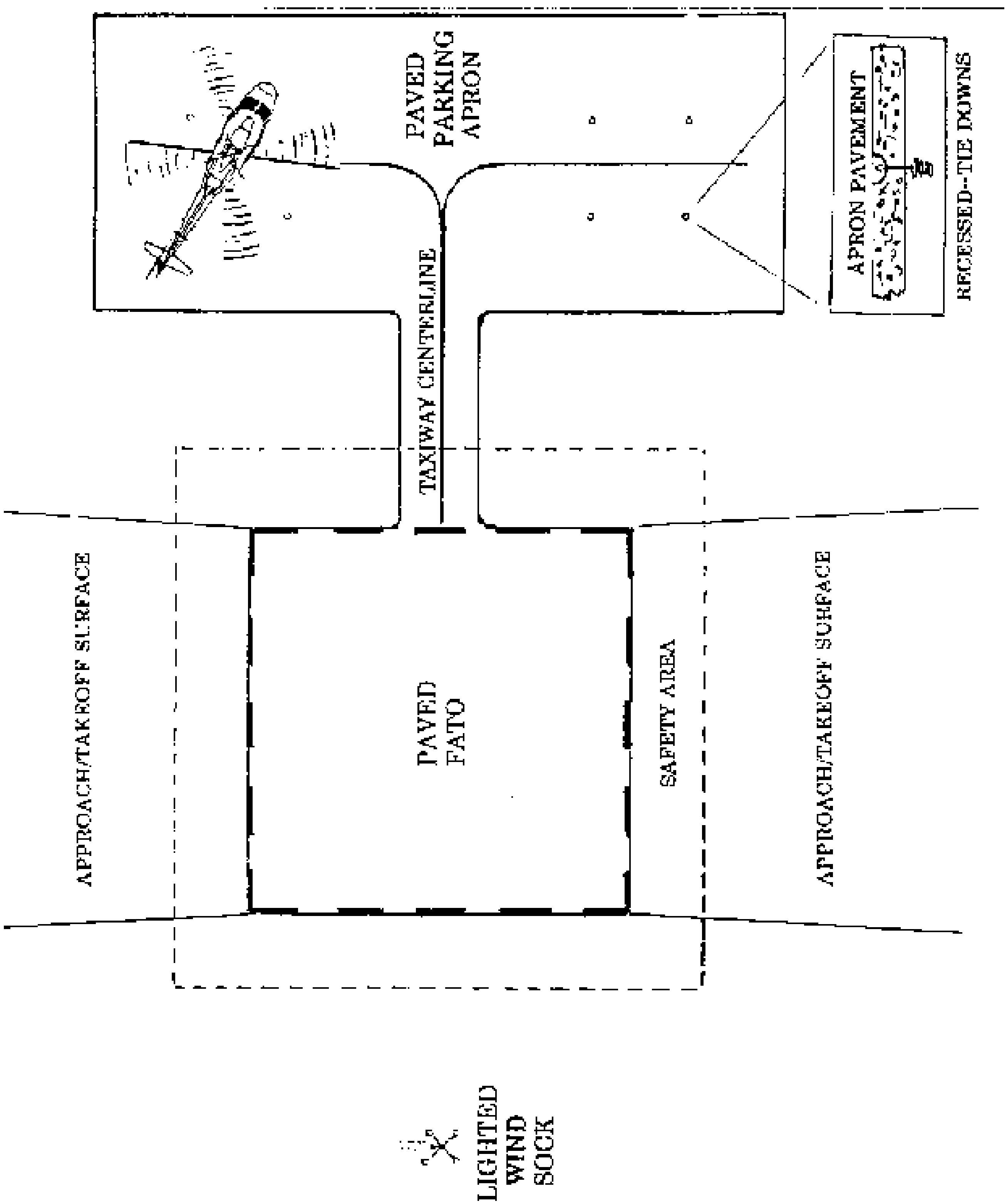



Figure 2-5. Helicopter parking

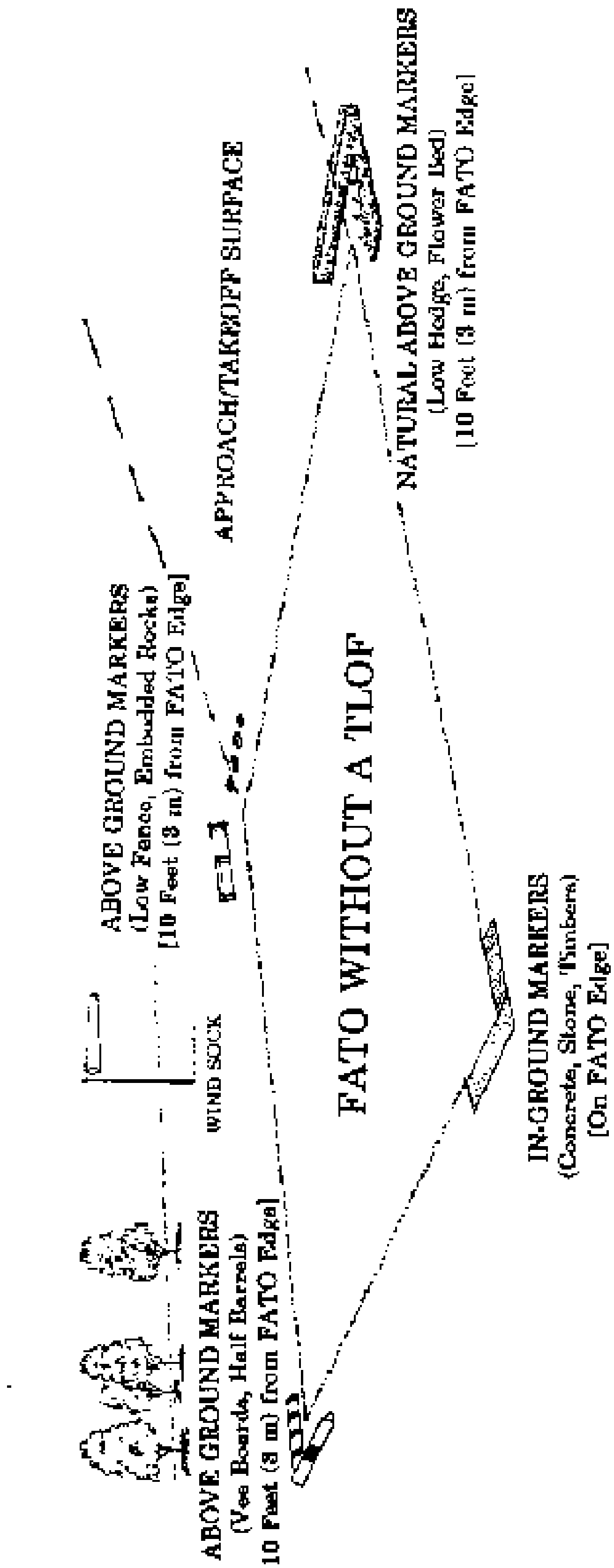



Figure 2-6. In-ground and raised markers

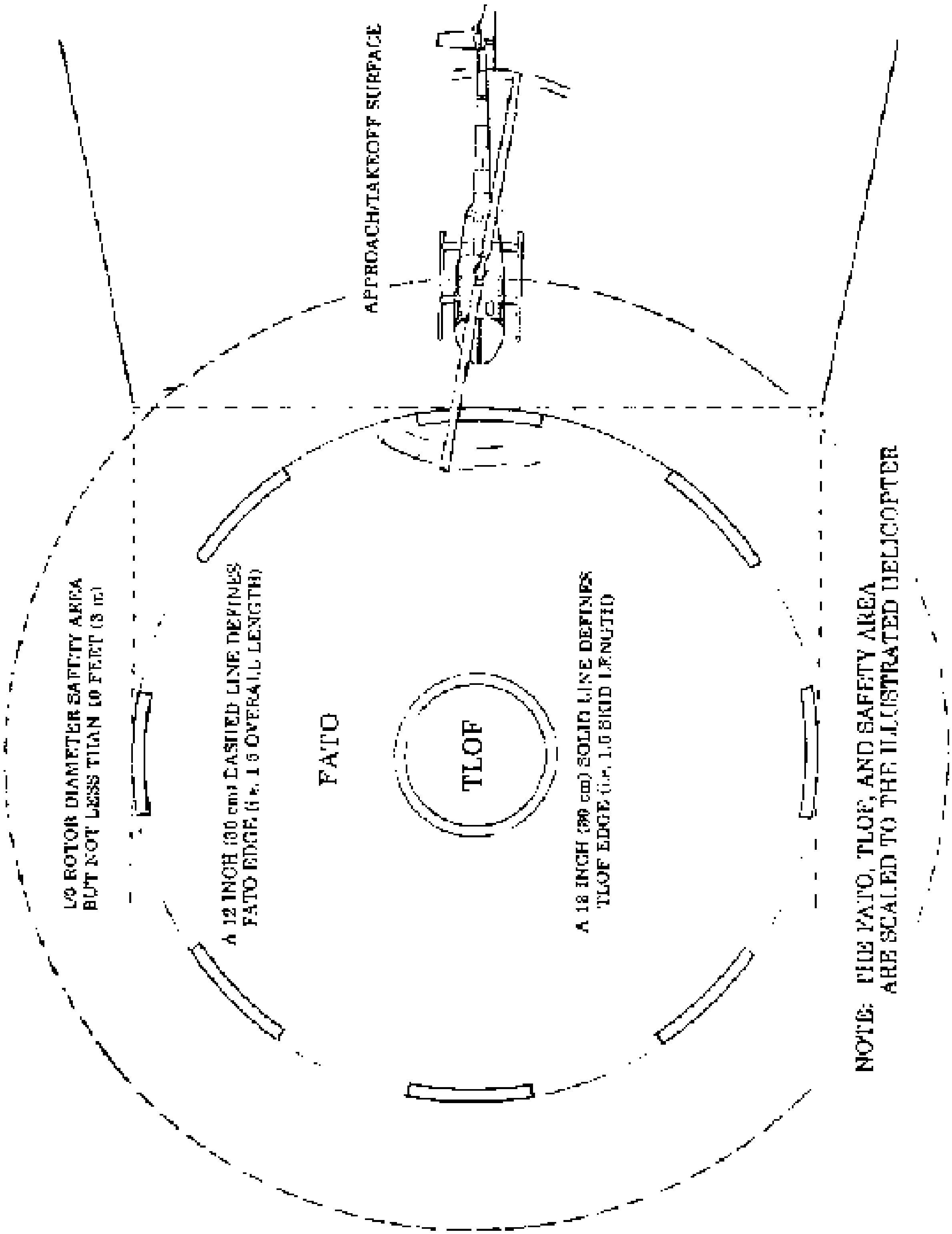



Figure 2-7. Marking paved heliports

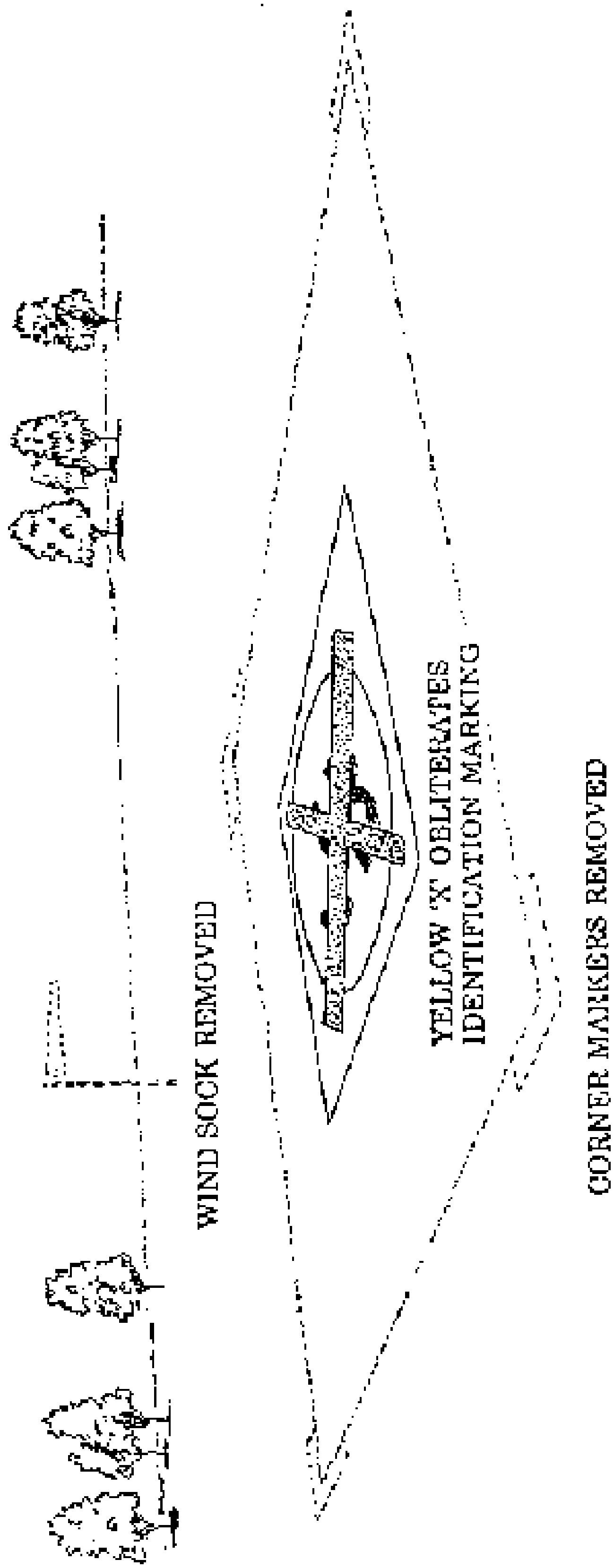



**Figure 2-8.** A closed heliport

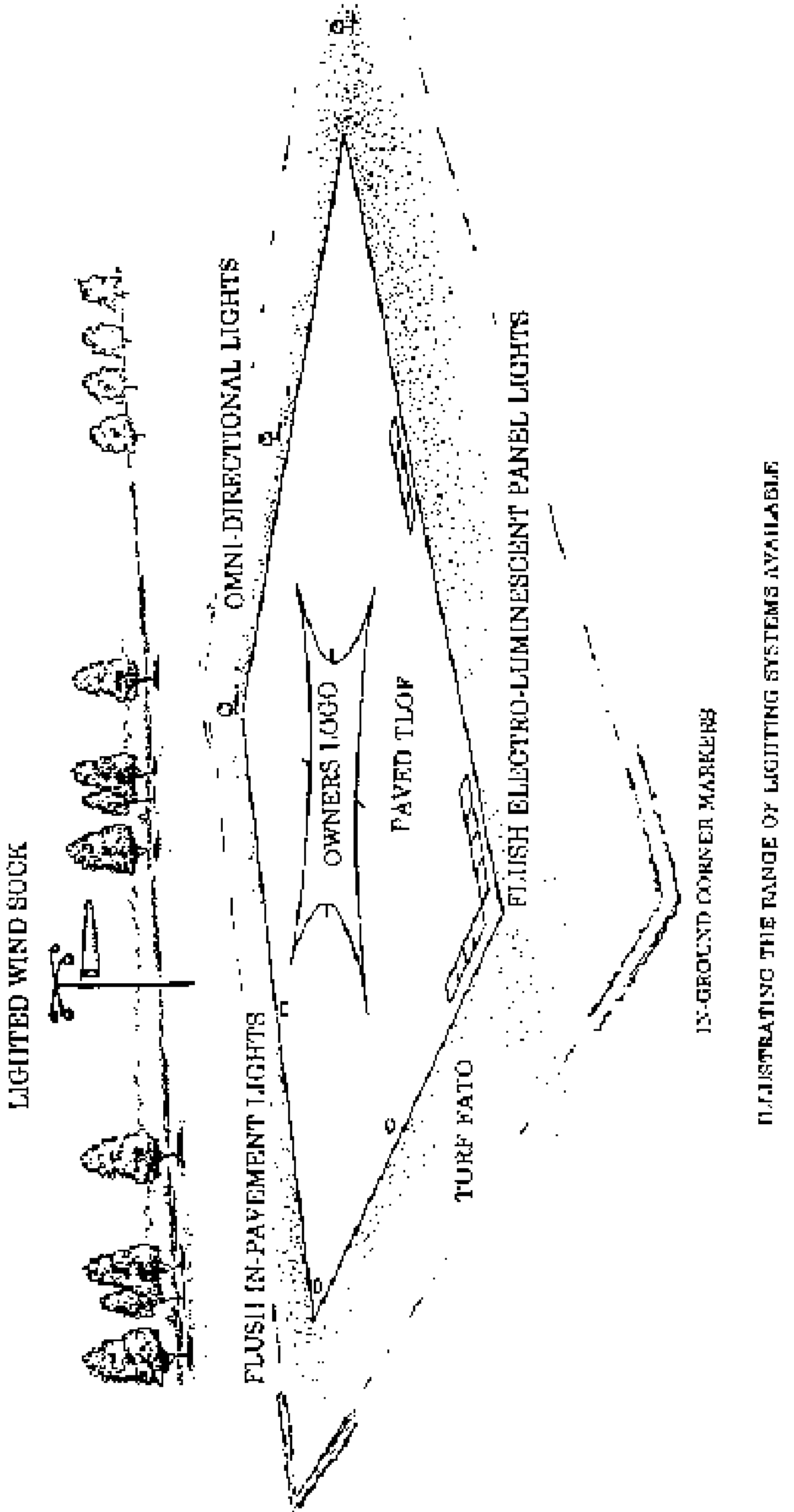



**Figure 2-9. Lighting a private use heliport**

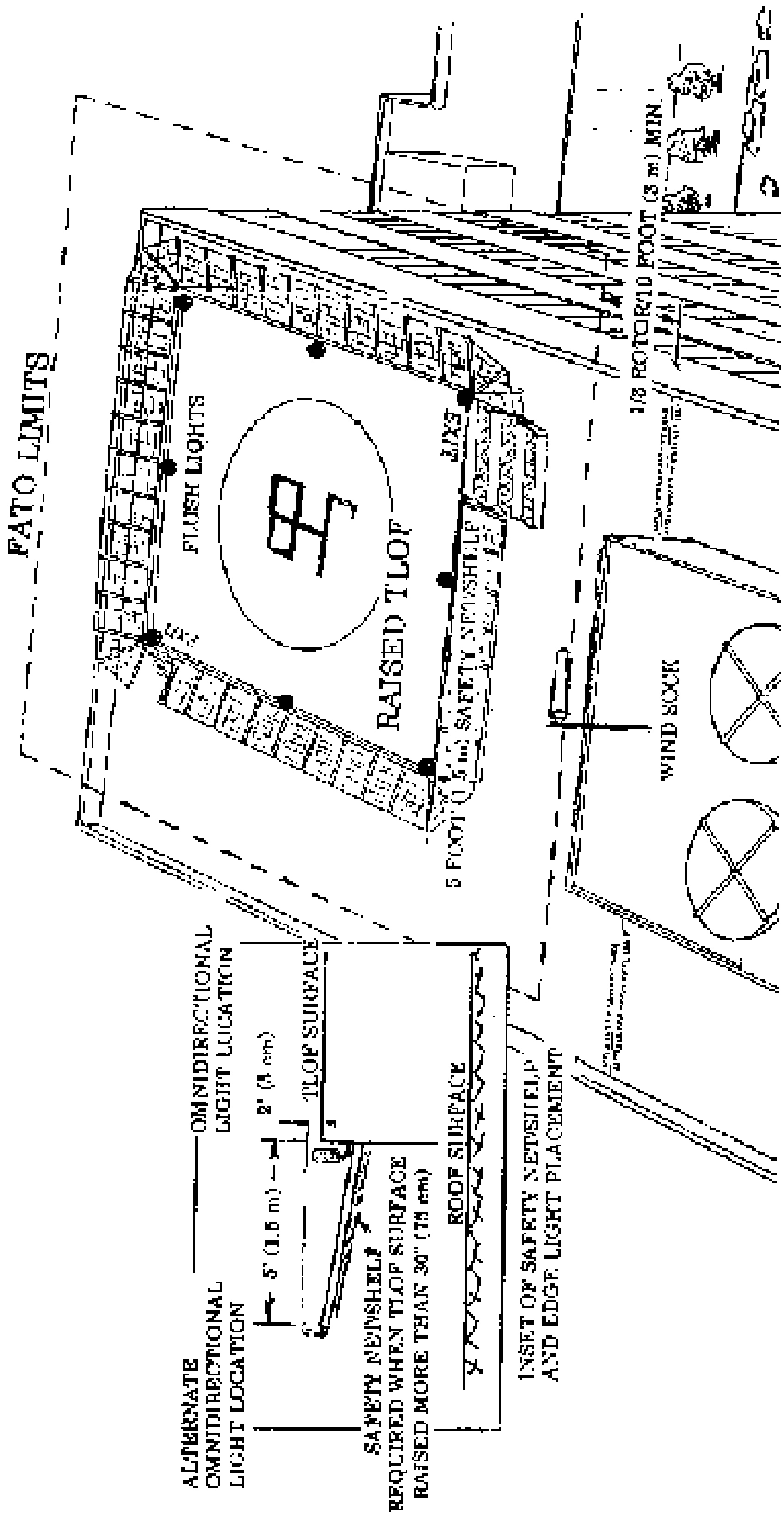



Figure 2-10. Lighting an elevated private use heliport

# CHAPTER 3. PUBLIC USE GENERAL AVIATION HELIPORTS

**23. GENERAL.** A public use heliport is a heliport available for use by the general public without a requirement for prior approval of the owner or operator. A public use general aviation heliport accommodates helicopters used by individuals, corporations, and helicopter air taxi services. Scheduled passenger services may be available if sufficient demand exists. The property needed for a public use general aviation heliport depends upon the volume and type of users and the scope of amenities, including automobile parking, provided. Property requirements for helicopter operators and for passenger amenities frequently exceeds that required for "air side" purposes. While the typical public use general aviation heliport is also publicly owned, public ownership is not a requirement for the public use designation. Public agencies and persons proposing to develop a general aviation heliport are encouraged to select a heliport site that has the potential for future expansion. This chapter contains standards and recommendations for designing a public use general aviation heliport. Figure 3-1 illustrates the essential features of a public use general aviation heliport.

**NOTE:** *To the extent that it is feasible to do so, existing public use heliports should be brought into conformity with the standards and recommendations in this AC at such time as major expansion or re-construction is undertaken.*

**24. FINAL APPROACH AND TAKEOFF AREA (FATO).** A public use general aviation heliport must have at least one FATO. The FATO may contain one or more touchdown lift-off areas--locations within its borders at which arriving helicopters terminate their approach in a hover or a landing, and from which departing helicopters takeoff.

**a. Location.** The FATO of a general aviation heliport may be at ground or water level, or at rooftop level.

**b. Size.** The least dimension (length, width, or diameter) of the FATO shall not be less than 1.5 times the overall length of the design helicopter. For heliports at elevations of 1,000 feet (300 m) or more above mean sea level, elongation by the amount determined from figure 3-2 is recommended. The elongation should be in the direction of takeoff.

**c. Gradients.** The FATO should be graded to remove surface irregularities and assure drainage. The recommended gradients for the FATO range from a minimum of 0.5 percent to a maximum of 5.0 percent. FATO grades should not exceed 2 percent in any area where a helicopter is expected to land.

**25. SAFETY AREA.** A safety area equal to 1/3 the rotor diameter of the design helicopter, but not less than 20 feet (6 m) in width, surrounds the FATO. The FATO and the safety area must be free and clear of objects such as parked helicopters, buildings, fences, or objects which could be struck by the main or tail rotor, or catch the skids, of an arriving or departing helicopter.

**26. TOUCHDOWN AND LIFT-OFF AREA (TLOF).** When the entire FATO is load bearing, an identifiable TLOF may not be required. A TLOF may have any shape. TLOFs are paved or other hard surfaces normally centered in the FATO. For irregularly shaped or oversized FATOs, the center of a TLOF is located at least 3/4 of the design helicopter's overall length in from the FATO boundaries. An elongated FATO may have an elongated TLOF or contain more than one TLOF as illustrated in figure 3-3.

**a. Size.** The recommended minimum dimension of the TLOF should not be less than the rotor diameter of the design helicopter.

**b. Surface Characteristics.** A Portland Cement Concrete (PCC) surface is recommended for ground level heliports. An asphaltic surface is "less desirable" for heliports as it may rut under the wheels or skids of a parked helicopter, a possible factor in some roll-over incidents. Pavements should have a broomed or other roughened finish that provides a skid resistant surface for helicopters and non-slippery footing for persons. Pavements should be designed to support 1.5 times the maximum takeoff weight of the design helicopter.

**c. Elevated TLOFs**. Elevated heliport TLOFs may be constructed of wood, metal, or concrete. The TLOF should be designed to support 1.5 times the maximum takeoff weight of the design helicopter. When the TLOF is on a platform elevated more than 30 inches (75 cm) above its surroundings, a 5 foot (1.5 m) wide safety net or shelf should be provided in lieu of a railing. The safety net or shelf should have a load carrying capability of at least 25 pounds per square foot (122 Kg per sq. m). The net or shelf, as illustrated in figure 3-4, should not project more than 2 inches (5 cm) above the level of the TLOF.

**d. Gradients.** To assure drainage, the TLOF should have a minimum gradient of 0.5 percent and a maximum gradient of 2.0 percent. To insure TLOF drainage, gradients of rapid runoff shoulders should range between 2.0 and 5.0 percent.

**27. APPROACH/TAKEOFF SURFACE.**

**a. Approach/Takeoff Path.** A public use general aviation heliport should have more than one approach/takeoff path. One of these paths should be oriented to align with the direction of the predominant wind. Approach/takeoff paths may curve to avoid objects and/or noise sensitive areas and utilize the airspace above public lands e.g. freeways, rivers, etc.

**b. Approach/Takeoff Surface.** An approach/takeoff surface is centered on each approach/takeoff path and conforms to the dimensions of the FAR Part 77 heliport approach surface. Figure 1-6 illustrates the FAR Part 77 heliport approach and transitional surfaces which must be free of hazards to air navigation. Paragraph 8 provides guidance on how to identify and mitigate hazards to air navigation.

**28. PROTECTION ZONE.** The protection zone is the property under lying the approach/takeoff surface out to where the surface is 35 feet (10.5 m) above the heliport elevation as illustrated in figure 3-5. The heliport proponent should own or control this property. The control should include the ability to clear incompatible objects and to preclude activities that contribute to the congregation of people.

**29. TAXI ROUTES AND TAXIWAYS.** A taxi route is both an object free right-of-way connecting the FATO to a parking area/apron, and a maneuvering aisle on the parking area/apron. Taxiways are paved surfaces, normally centered in a taxi route, used by wheel equipped helicopters in ground maneuvering. The relationship between taxi routes and paved taxiways is illustrated in figures 3-6 and 3-7.

**a. Widths.**

**(1) Taxi Routes.** The width of a taxi route is determined by adding the clearance specified in "b" below to the maximum rotor diameter of the helicopter that will hover or ground taxi.

**(2) Taxiways.** The width of a paved taxiway should be designed to provide at least twice the undercarriage width of the design helicopter.

**b. Clearances.** Taxi routes and taxiways should be designed to provide 20 feet (6 m) of rotor tip clearance to objects and parked helicopters for hover taxiing, and 10 feet (3 m) of clearance for ground taxiing.

**c. Surfaces.** Unpaved portions of taxi routes should have a turf cover, or be treated in some manner, to prevent dirt and debris from being raised by a taxiing helicopter's rotor wash. Taxiways may have an asphaltic, portland cement, or other stabilized surface. Taxiway pavements should be capable of sustaining the maximum gross weight of the design helicopter under all weather conditions.

**d. Gradients.** Taxiway longitudinal gradients should not exceed 2.0 percent. Transverse gradients should not be less than 0.5 percent nor greater than 2.0 percent.

**30. HELICOPTER PARKING.** A public use general aviation heliport, unless designed as a helistop, should have an area designated for parking helicopters. The size of the area or apron depends upon the number of helicopters to be accommodated. Parking positions should be designed to accommodate the range of helicopter sizes expected at the facility. Individual parking pads may be used in lieu of an apron.

**a. Size.** Parking position size is dependent upon the helicopter size and the intended paths in maneuvering in and out of the parking position. There should be at least 1/3 rotor, but not less than 10 feet (3 m), of clearance between skid equipped helicopters and at least 10 feet (3 m) for wheel equipped helicopters to another helicopter or object. Clearances are measured from any part of a helicopter with the helicopter on the intended path. Tail rotor clearance may become the critical clearance when the helicopter turns 30 degree or more within a parking position. Figure 3-7 illustrates apron design concepts and figure 3-15 illustrates parking position clearances.

**b. Parking Pads.** The least dimension of a parking pad should be a minimum of 1.5 times the undercarriage length or width of the design helicopter.

**c. Fueling.** AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing on Airports, contains guidance on fueling services. Systems for storing and dispensing fuel must conform to federal, state, and local requirements for petroleum handling facilities. Guidance is found in AC 150/5230-4, Aircraft Fuel

Storage, Handling, and Dispensing on Airports, and appropriate National Fire Protection Association (NFPA) publications. Fueling locations should be designed and marked to minimize the potential for helicopters to collide with the dispensing equipment. The area should be lighted if night fueling operations are contemplated.

**d. Additional Apron.** Additional area may be required adjacent to hangars used by private helicopter owners and for hangars and other structures used by fixed base operators.

**e. Tie Downs.** Recessed tie downs may be installed to accommodate extended or overnight parking of based or transient helicopters. Guidance on recessed tie downs recommended for extended or overnight parking is found in AC 20-35, Tiedown Sense.

**31. HELIPORT MARKERS AND MARKINGS.** Markers and/or surface markings identify the facility as a heliport, the perimeter of the FATO and TLOF, any taxi route, taxiway, and/or parking positions. Surface markings may be paint or preformed material. Heliport FATOs and TLOFs are defined with in-ground markers and/or surface white lines. Taxi routes are defined with raised edge markers. Taxiways and aprons are defined with yellow lines/markings. Lines/markings may be outlined with a 6 inch (15 cm) wide stripe of a contrasting color to enhance conspicuity.

**a. Perimeter Markings.** The perimeter of the FATO and/or TLOF should be defined with markers and/or lines. Figure 3-8 illustrates a heliport with in-ground markers and surface markings while figure 3-9 illustrates a heliport with surface markings.

**(1) Unpaved FATOs.** The perimeter of an unpaved FATO is defined with in-ground markers, approximately 1 foot by 5 foot (30 cm by 1.5 m), located at the corners and along the FATO edges.

**(2) Paved FATOs.** A 1 foot (30 cm) wide dashed white line defines the FATO perimeter. The segments and separation between segments should be even. The corners must be defined and the edge segments should be approximately 5 feet (1.5 m) in length.

**(3) TLOFs.** A continuous 12 inch (30 cm) wide solid white line defines the perimeter of a paved or hard surfaced TLOF. A continuous 12 inch (30 cm) in-ground marking defines the perimeter of a load-bearing aggregate-turf TLOF.

**b. Identification Marking.** An in-ground H marking will identify the heliport as a public use facility as well as mark the intended landing position within the FATO. The letter H is illustrated in figures 3-7 and 3-8. The H is oriented on the axis of the dominate approach/takeoff path. A bar may be placed under the H when it is necessary to distinguish the preferred approach direction. Appendix 2 contains dimension recommendations.

**c. Taxi Route and Taxiway Markings.** Taxi route edges are defined with yellow-blue-yellow raised markers that are not more than 8 inches (20 cm) in height nor less than 4 inches (10 cm) in diameter. Taxiway centerline and edges are marked with yellow lines. The centerline is a continuous 6 inch (15 cm) wide yellow line. The edges are defined with two continuous 6 inch (15 cm) wide yellow lines spaced 6 inches (15 cm) apart. Figure 3-6 illustrates taxiway centerline and edge markings.

**d. Apron Markings.** In addition to the taxiway and parking position markings, the yellow (double) taxiway edge lines continue around the apron to define the apron edge. Figures 3-7 and 3-15 illustrate apron markings.

**e. Parking Position Markings.** The yellow taxiway centerline continues into the individual parking positions to define the centerline of the parking positions. A parking position is further identified by a 12 inch (30 cm) wide yellow line defining a circle. The diameter of the circle is equal to the rotor diameter of the largest helicopter the position is designed to accommodate.

**f. Closed Heliport.** All markings of a permanently closed heliport, FATO, or TLOF should be obliterated. If it is impractical to obliterate markings, a yellow X, as illustrated in figure 3-10, should be placed over the H. The yellow X must be large enough to ensure early pilot recognition that the heliport is closed.

**32. HELIPORT LIGHTING.** For night operations, the FATO or TLOF, but not both, and taxiways (or taxi routes) need to be lighted. Yellow lights define the limits of the FATO or TLOF. Flush green lights define taxiway centerlines. Blue omni-directional lights or reflectors define taxi route edges. Figure 3-11 illustrates these lighting systems. AC 150/5340-19, Taxiway Centerline Lighting System, AC 150/5340-24, Runway and Taxiway Edge Lighting System, and AC 150/5345-46, Specification for Runway and Taxiway Light Fixtures, contain technical guidance on lighting equipment and installation details.

**a. Perimeter Lights.** A minimum of 4 flush or raised light fixtures is recommended per side of a square or rectangular FATO or TLOF. A light is located at each corner with additional lights uniformly spaced between the corner lights with a maximum interval of 25 feet (7.5 m) between lights. An even number of lights, at least eight, uniformly spaced with a maximum interval of 25 feet (7.5 m) between lights is required to define a circular FATO or TLOF. Flush lights may be located on the TLOF edge or within 1 foot (30 cm) of the TLOF edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, should be located 10 feet (3 m) out from the TLOF edge and should not penetrate a horizontal plane at the TLOF's elevation by more than 2 inches (5 cm). When non-flush lights are used on a raised TLOF, they should be positioned as illustrated in figure 3-11. In snow areas, it is recommended that these lights be placed along the outer edge of the safety net/shelf to minimize the chances of being damaged by snow removal operations.

**b. Landing Direction Lights.** Landing direction lights are a configuration of five L-861 lights with omni- directional yellow lenses. The lights are spaced at 15 foot (4.5 m) intervals beginning at the line of perimeter lights and extend outward in the direction of the preferred approach/takeoff path as illustrated in figure 3-11. Landing direction lights are an optional feature to be installed when it is necessary to provide directional guidance.

**c. Taxi Route and Taxiway Lighting.**

**(1) Taxi Routes.** The edges of a taxi route, that does not contain a paved taxiway, are defined with blue lenses on raised lighting fixtures or reflectors modified to be no more than 8 inches (20 cm) tall. Taxi route lights or reflectors are placed at intervals of 50 feet (15 m) on straight sections and 25 feet (7.5 m) on curved sections. A minimum of four lights are needed to define a curve. Blue retro-reflector Type II markers spaced at 50 foot (15 m) intervals may be used to identify the edges of a taxi route.

**(2) Taxiways.** Taxiway centerlines are defined with flush L-852A bi-directional or L-852B uni-directional green lights. The lights are spaced at 50 feet (15 m) intervals on straight sections and at 25 feet (7.5 m) intervals on curved sections with a minimum of four lights needed to define the curve. Green retro- reflective markers meeting requirements for Type II markers in AC 150/5345-39, FAA Specification L-853, Runway and Taxiway Centerline Retro-reflective Markers, may be used in lieu of the L-852A or L-852B lighting fixtures.

**b. Heliport Identification Beacon.** A heliport identification beacon is recommended to aid pilots in locating the heliport when its location cannot be readily identified by a prominent lighted landmark. The beacon, flashing white/green/yellow at the rate of 30 to 45 flashes per minute, should be located on or close to the heliport. Guidance on heliport beacons is found in AC 150/5345-12, Specification for Airport and Heliport Beacon.

**e. Floodlights.** Floodlights may be used to illuminate the apron. To eliminate the need for tall poles, these floodlights may be mounted on adjacent buildings. Care should be taken, however, to place floodlights clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces. Floodlights should be aimed down and provide a minimum of 3 foot candles (32 lux) of illumination on the apron surface. Floodlights which might interfere with pilot vision during takeoff and landings must be capable of being turned off during landings and takeoffs.

**33. WIND DIRECTION INDICATOR.** A wind sock conforming to AC 150/5345-27, Specification for Wind Cone Assemblies, is recommended to show the direction and magnitude of the wind. Wind socks must be lighted for night operations. The wind sock should be placed where it provides a true indication of surface wind and is clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces. The wind sock should provide the best possible color contrast to its background. When the heliport is large or located among buildings, wind direction and speed may differ significantly from one part of the heliport to another and multiple wind socks may be necessary.

**34. VISUAL GLIDE PATH INDICATORS.** A visual glide path indicator, such as Heliport Approach Path Indicator (HAPI), Visual Approach Slope Indicator (VASI), or Precision Approach Path Indicator (PAPI), provides pilots with visual course and descent cues. The lowest on course visual signal must provide a minimum of 1 degree of clearance over any object in the approach path that lies within 10 degrees of the approach course centerline. The optimum location of a visual glide path indicator is on the extended centerline of the approach path at a distance that brings the helicopter to a hover 3 to 8 feet (0.9 to 2.5 m) above the TLOF center. Figure 3-12 illustrates visual glide path indicator clearance criteria. AC 150/5345-28, Precision Approach Path Indicator (PAPI) Systems, and AC 150/5345-52, Generic

Visual Glideslope Indicators (GVGI), provide additional information.

**35. TERMINAL FACILITIES.** The heliport terminal requires curb side access for passengers using private autos, taxicabs, and public transit vehicles. Public waiting areas need the usual amenities and a counter for rental car services may be desirable. Passenger auto parking areas should accommodate current requirements and have the capability of being expanded to meet future requirements. Readily available public transportation may reduce the requirement for employees and service personnel auto parking spaces. The heliport terminal building or sheltered waiting area should be attractive and functional. AC 150/5360-9, Planning and Design of Airport Terminal Facilities at Non-Hub Locations, contains guidance on designing terminal facilities.

**36. SAFETY CONSIDERATIONS.** The following safety related features should be provided on an as needed basis.

**a. Wire Marking And Lighting.** Unmarked electric and telephone wires in the heliports immediate area may be difficult to see. It is recommended that, where practical, wires located within 500 feet (150 m) of the FATO, as well as those within 1/2 mile (1 km) that are beneath and up to 100 feet (30 m) to the side of an approach/takeoff path be marked to make them more conspicuous. Figure 3-13, illustrates the area of concern. Guidance on marking and lighting objects is contained in AC 70/7460-1, Obstruction Marking and Lighting.

**b. Security.** Ground level general aviation heliports may require their operational areas to be fenced to prevent the inadvertent or unauthorized entry of persons or vehicles. Fences should be as low as possible and located as far as possible from the FATO. Fences should not penetrate any approach/ takeoff or transitional surface. Access to airside areas should be through controlled and locked gates or doors displaying a cautionary sign similar to that illustrated in figure 3-14.

**c. Rescue and Fire Fighting Services.** Rescue and fire fighting service requirements vary. Public use utility heliports should meet (NFPA) Pamphlet 418, Standards for Heliports, and (NFPA) Pamphlet 403, Aircraft Rescue Services, criteria. A fire hose cabinet or extinguisher should be provided at each access gate and each fueling location. Fire hose cabinets, fire extinguishers, and other fire fighting equipment at elevated TLOFs should be located adjacent to, but below the level of the TLOF.

**d. Equipment/Object Marking.** Heliport maintenance and servicing equipment, as well as other objects used in the air side operational areas, should be made conspicuous with reflective tape, paint, or other markings. Particular attention should be given to marking objects that are hard to see in marginal visibility such as at night, in mist, or in fog.

**e. Passenger Walkways.** Passenger movement in operational areas should be restricted to marked walkways. Figure 3-15 illustrates one marking scheme. Apron pavements should be designed so that spilled fuel does not drain onto passenger walkways or toward parked helicopters. Two separated access points are required for elevated TLOFs.

**f. Communications and Weather.** A UNICOM radio may be used to provide arriving helicopters with heliport and traffic advisory information but may not be used to control air traffic. The Federal Communications Commission (FCC) should be contacted for information on UNICOM licensing. An AWOS measures and automatically broadcasts current weather conditions at the heliport site. When an AWOS is installed, it should be located at least 100 feet (30 m) and not more than 700 feet (215 m) from the edge of the TLOF. Guidance on AWOS systems is found in AC 150/5220-16, Automated Weather Observing Systems (AWOS) for Non- Federal Applications.

**g. Winter Operations.** Swirling snow raised by a landing helicopter's rotor wash can cause the pilot to lose sight of the intended landing point. Swirling snow on takeoff can hide objects which need to be avoided. At least the TLOF, and as much of the FATO and the safety area as practical, should be kept free of snow. Guidance on winter operations is found in AC 150/5200-30, Airport Winter Safety and Operations.

**37. ZONING AND COMPATIBLE LAND USE.** Where state statutes permit, the sponsor of a public use general aviation heliport is encouraged to promote the adoption of zoning measures to ensure that the heliport will continue to be available for public use as well as to protect the community's investment in the facility.

**a. Zoning to Limit Building/Object Heights.** General guidance on drafting an ordinance which would limit building and object heights is contained in AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports. The ordinance should substitute the heliport surfaces for the airport surfaces in the model ordinance.

**b. Zoning for Compatible Land Use.** A zoning ordinance may be enacted, or an existing ordinance modified, to control the use of property within the heliports approach/takeoff path environment. The ordinance should restrict activities to those which are compatible with helicopter operations.

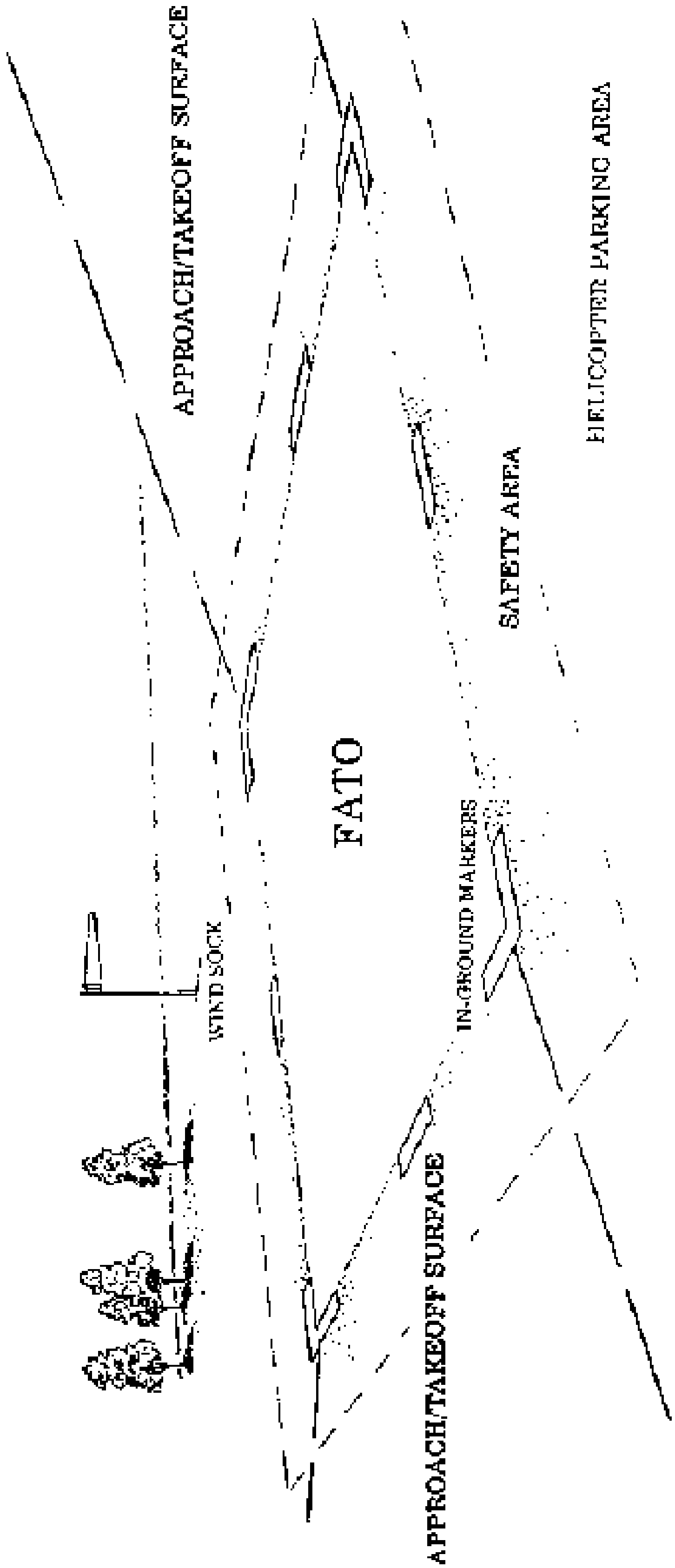



Figure 3-1. Essential features of a general aviation heliport

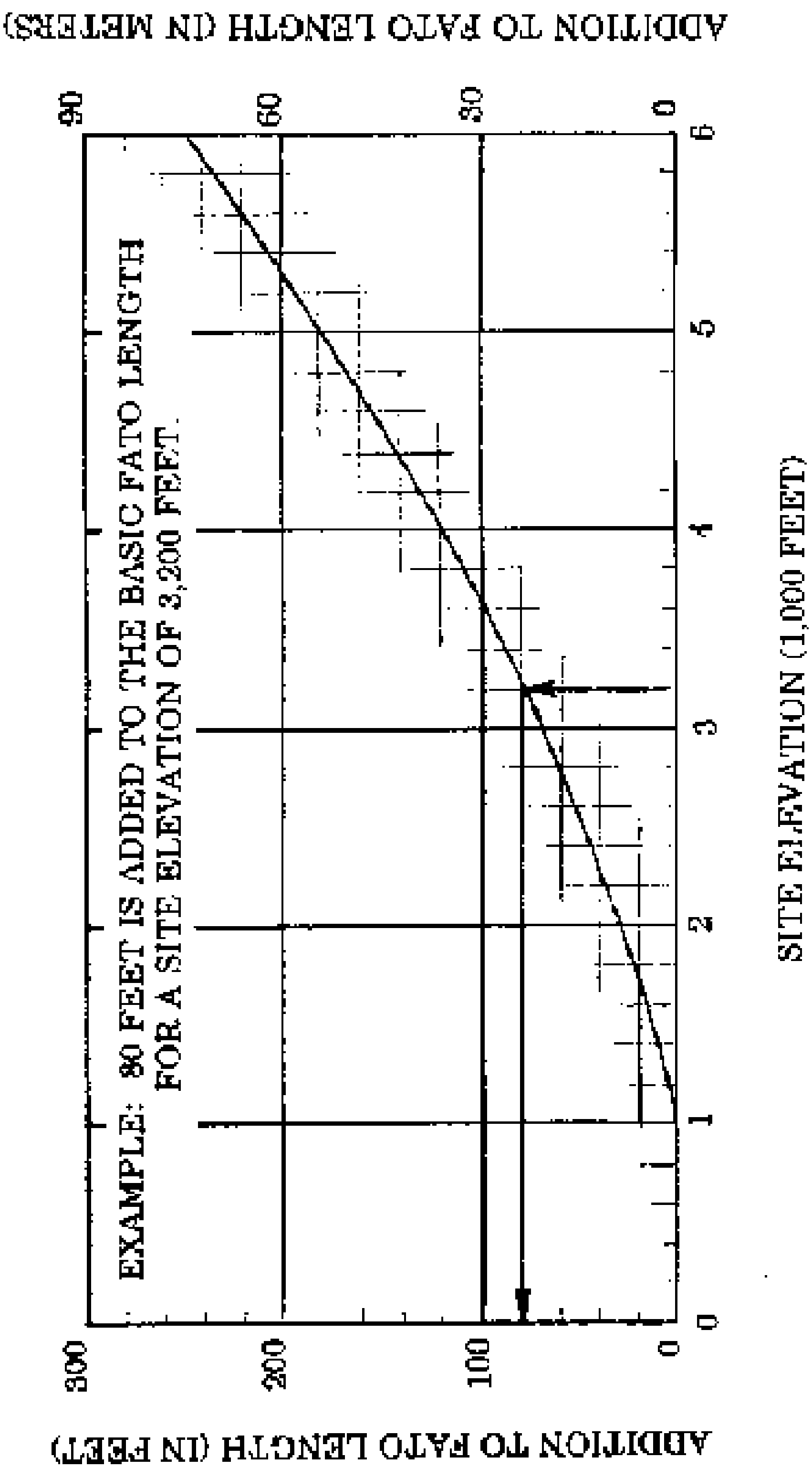



Figure 3-2. FATO length increase for elevation

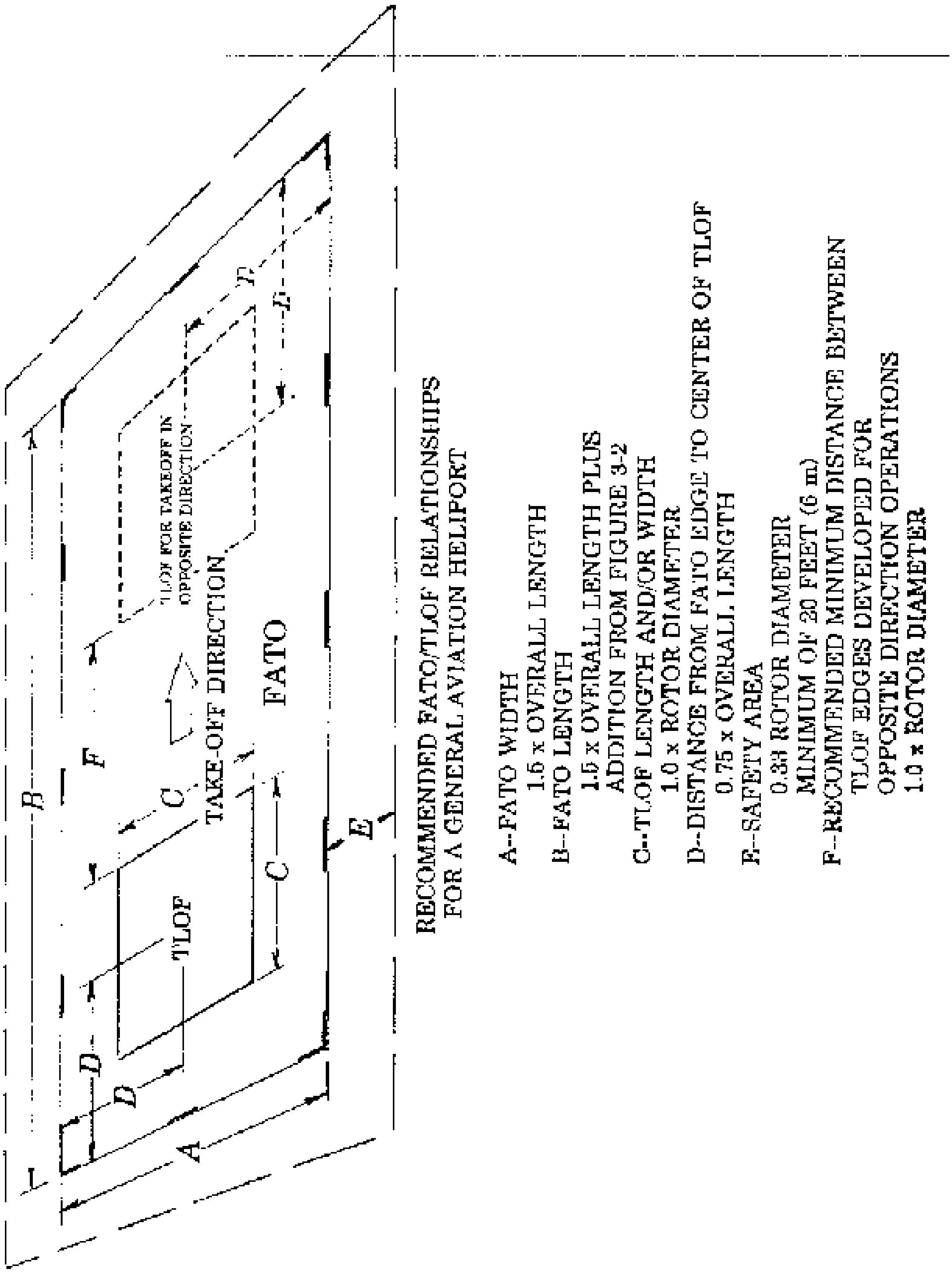



Figure 3-3. A lengthened FATO with two TLOFs

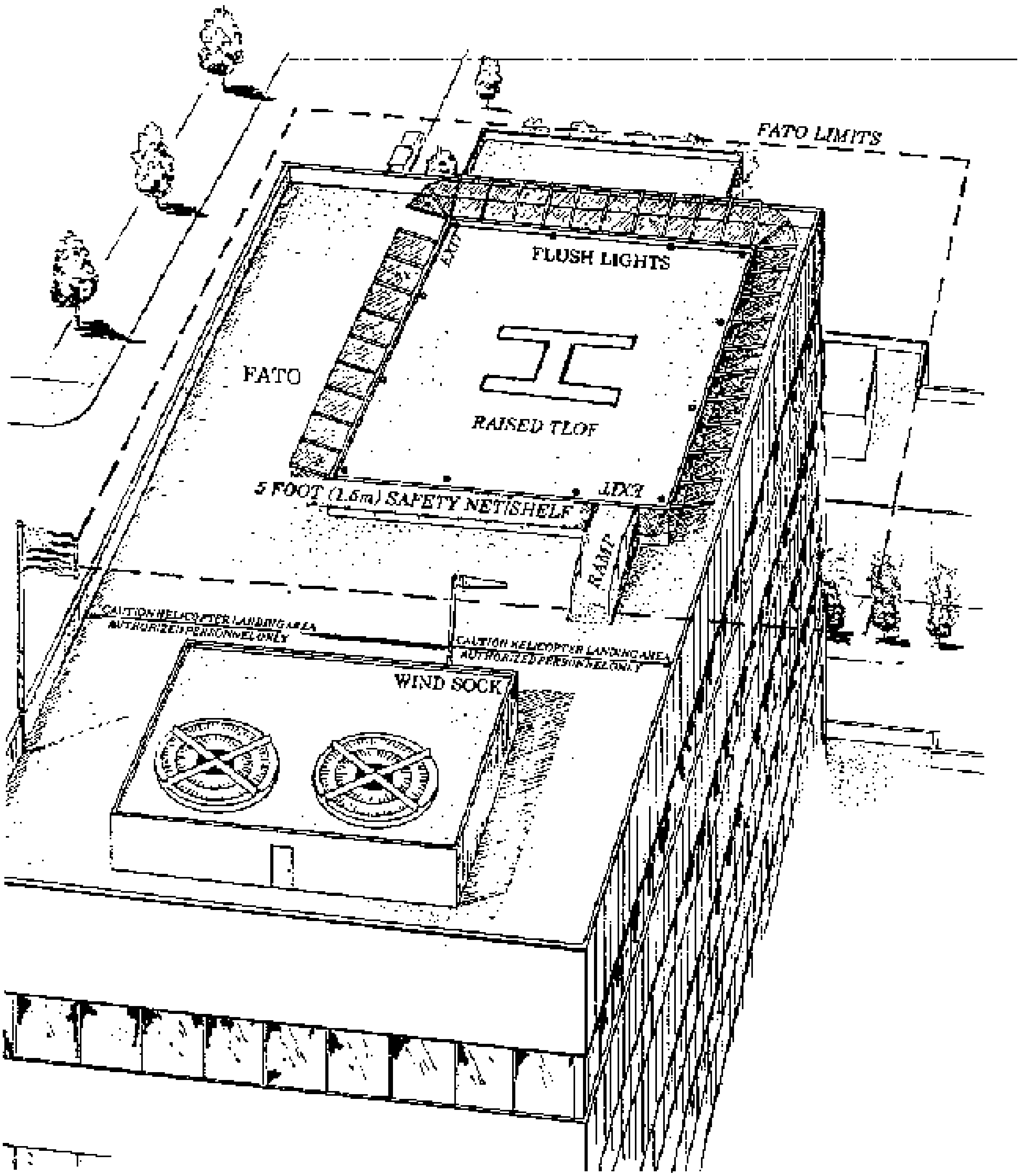



Figure 3-4. Raised TLOF with a safety net

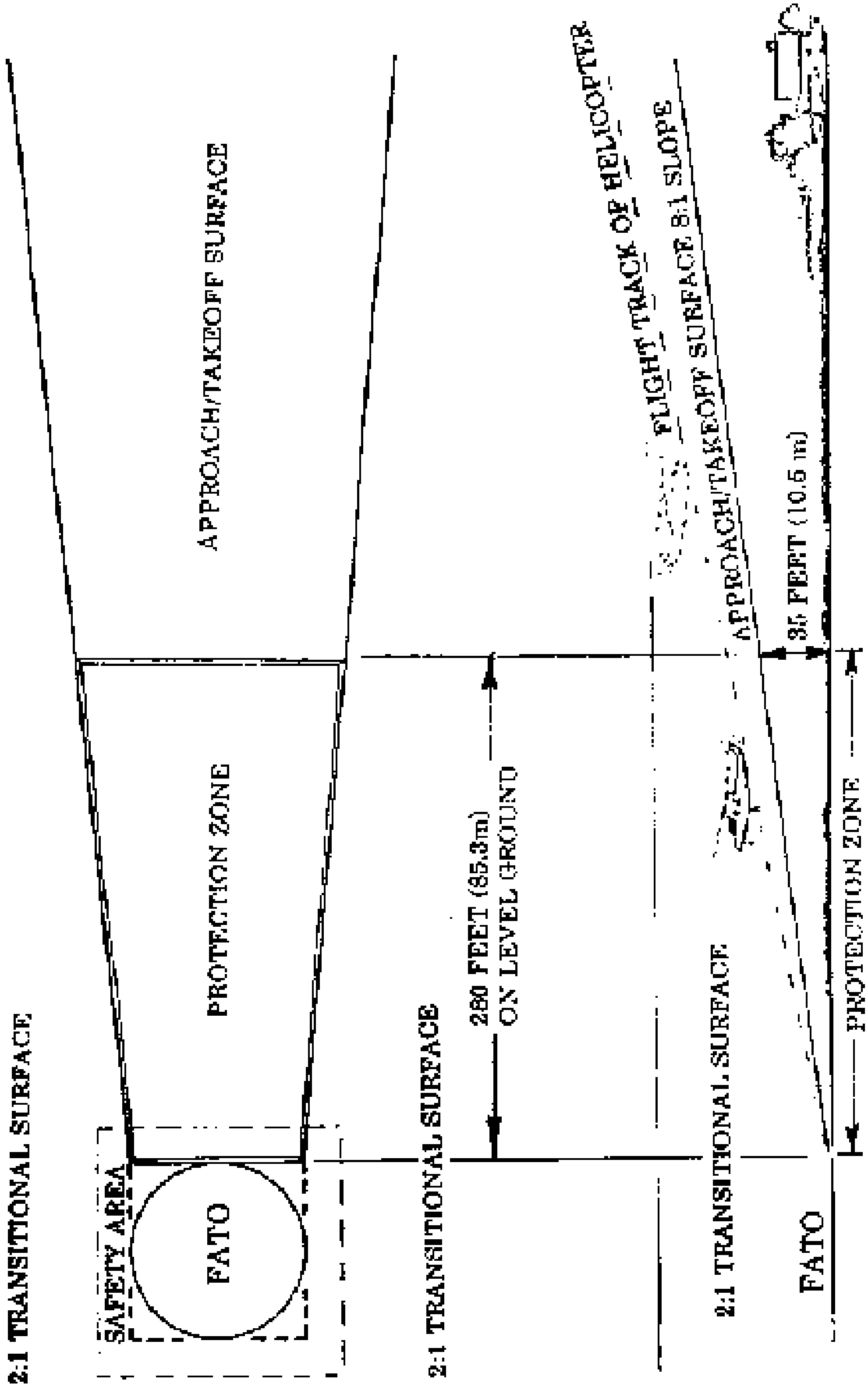
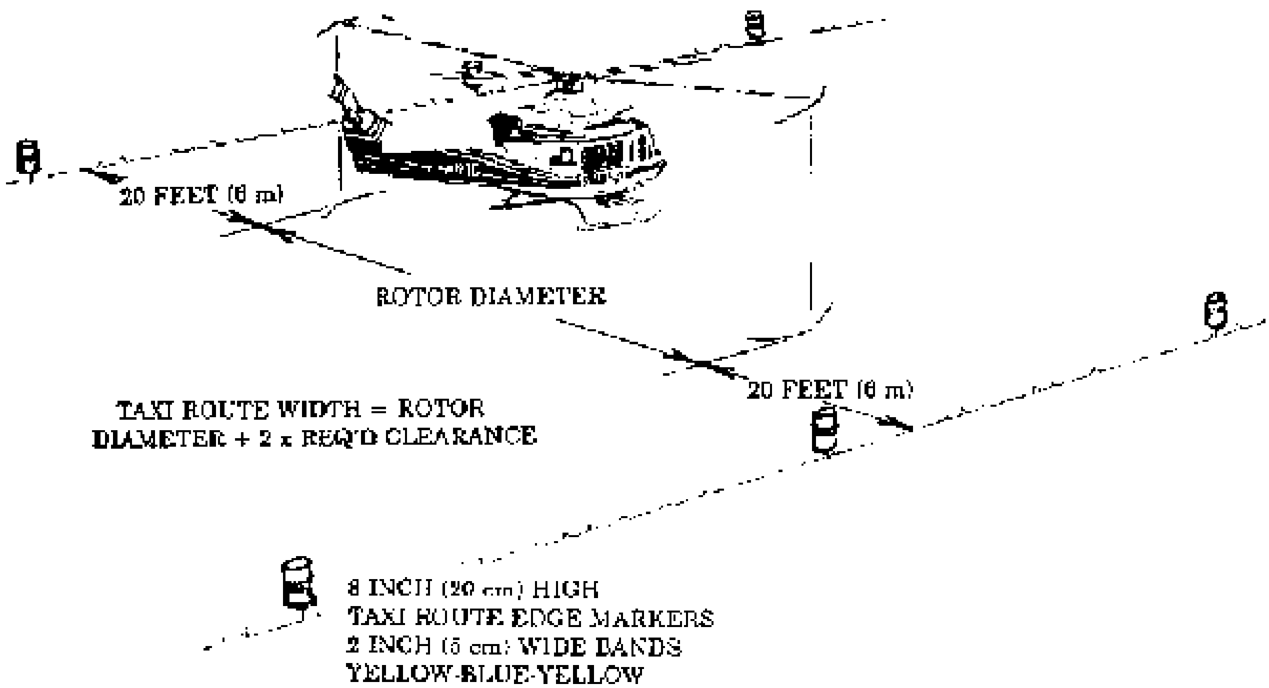
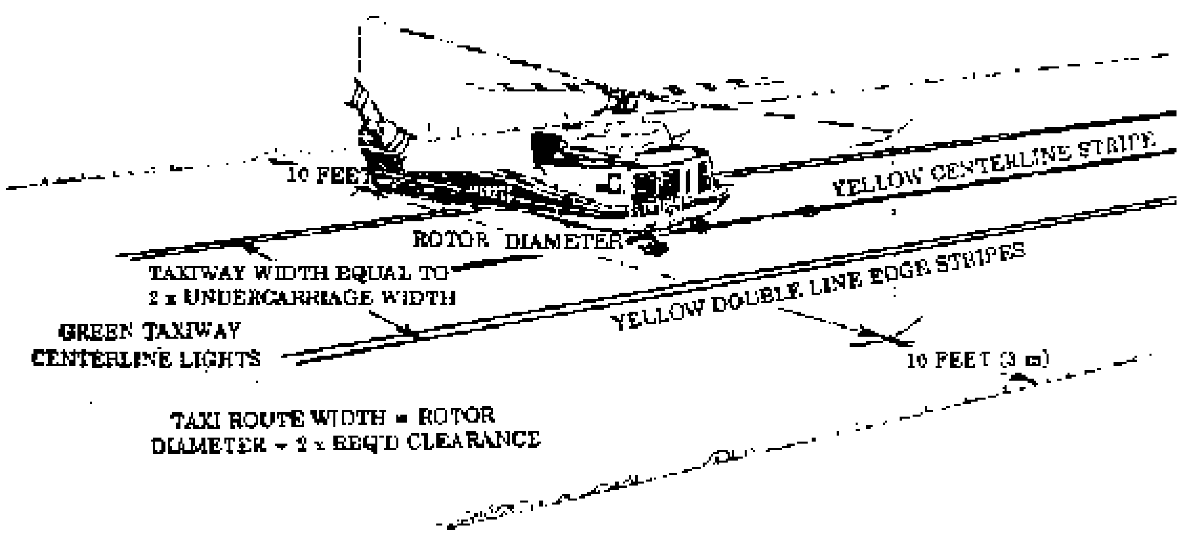



Figure 3-5. Protection zone




TAXI ROUTE WITHOUT A PAVED TAXIWAY




TAXI ROUTE WITH PAVED TAXIWAY

Figure 3-6. Taxi route and taxiway markings

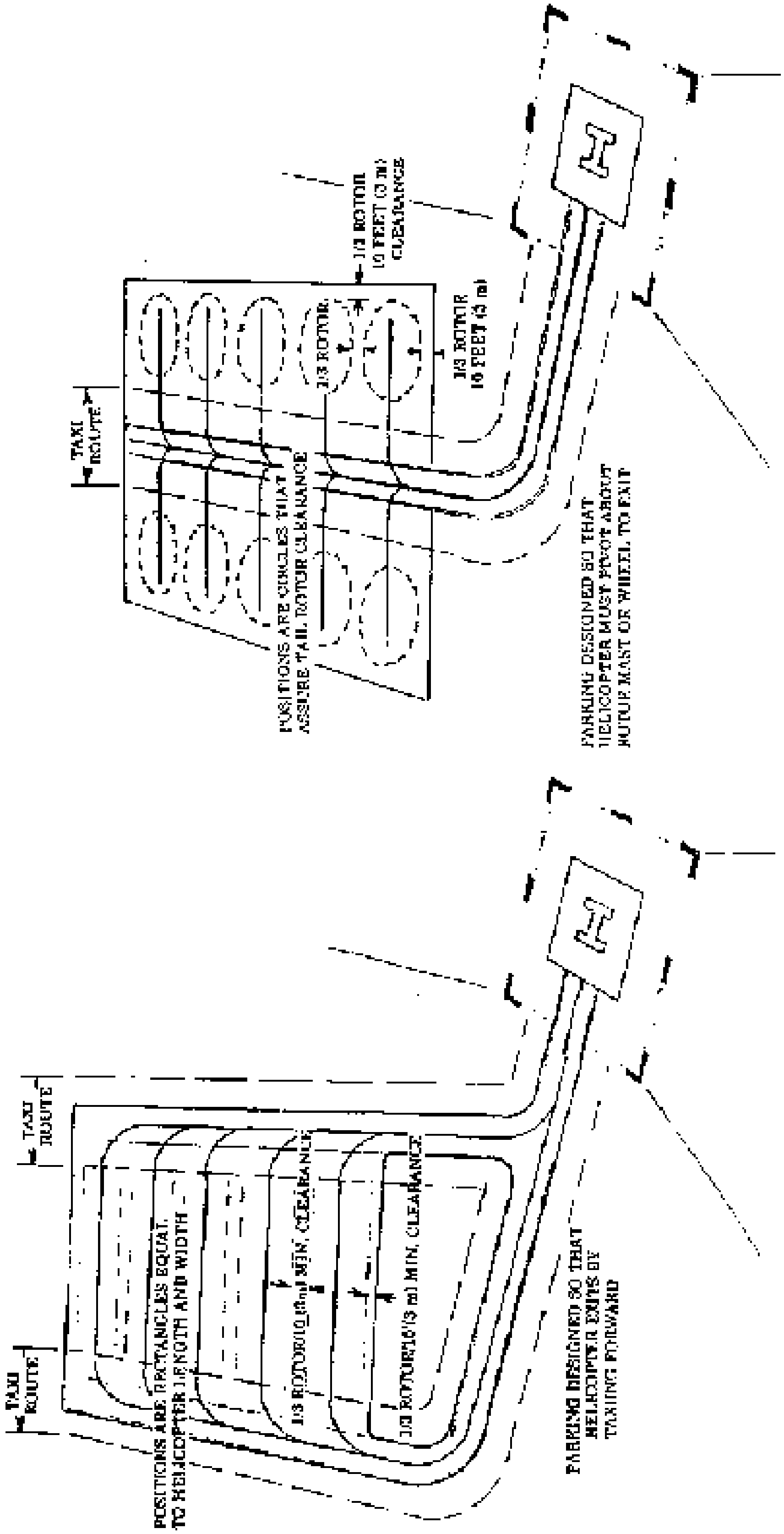



Figure 3-7. Parking apron design

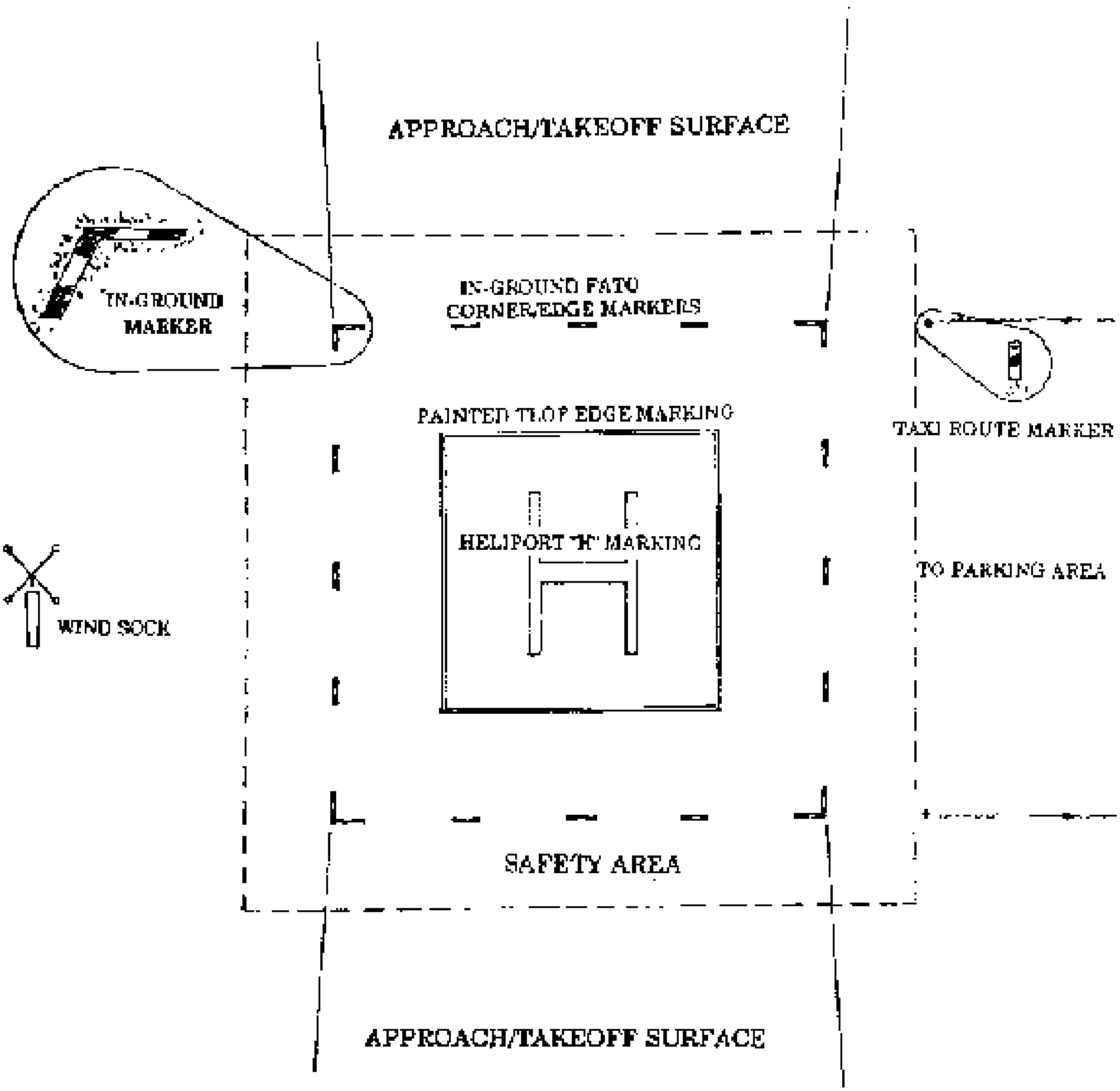



Figure 3-8. Heliport with markers and markings

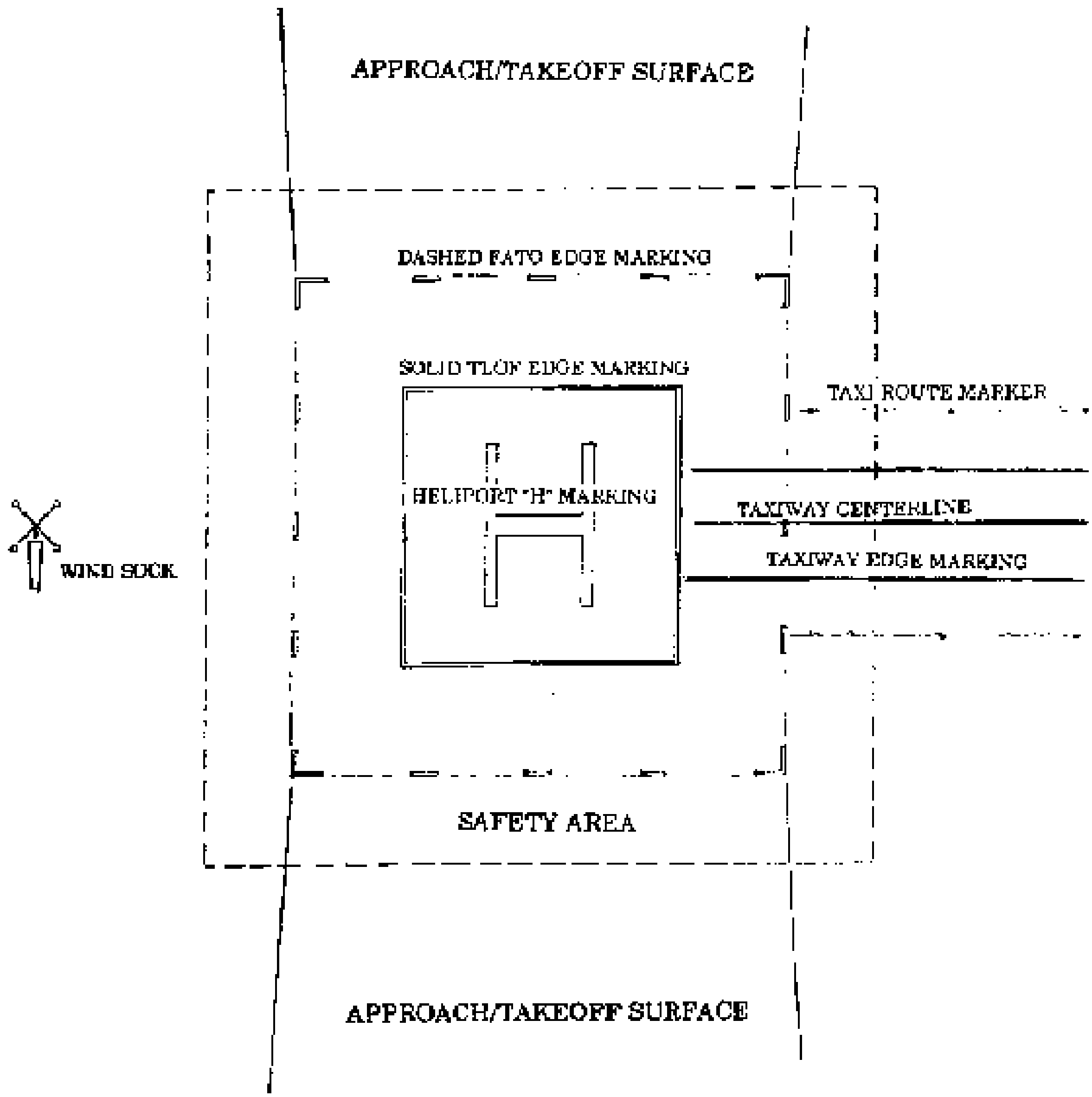



Figure 3-9. Heliport with surface markings

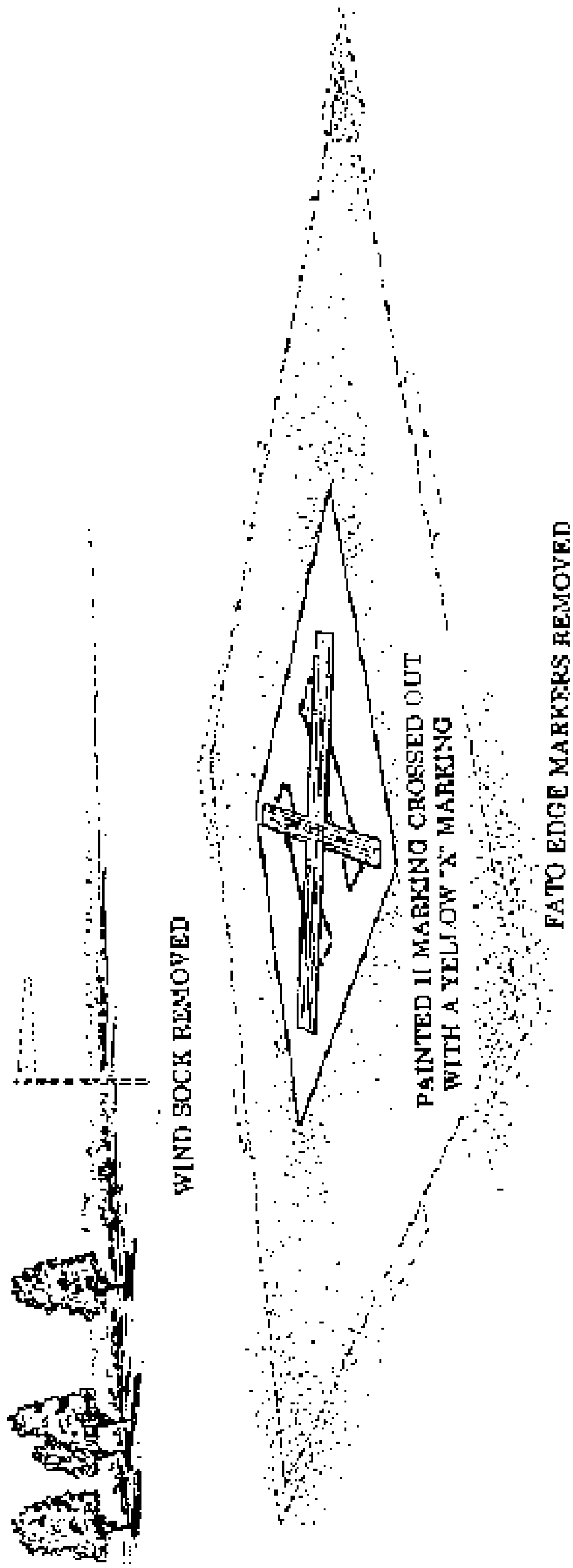



Figure 3-10. Marking a closed heliport

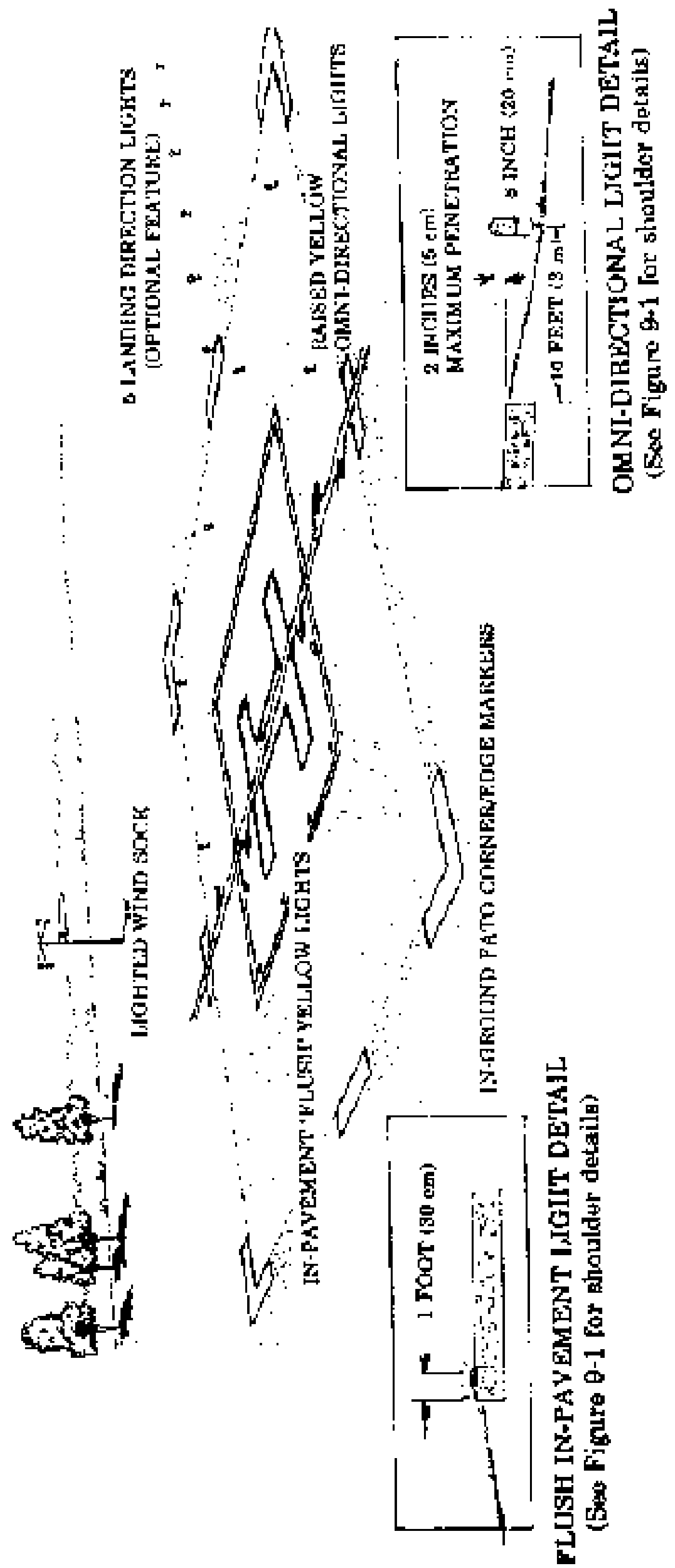



Figure 3-11. Lighting system for night operations

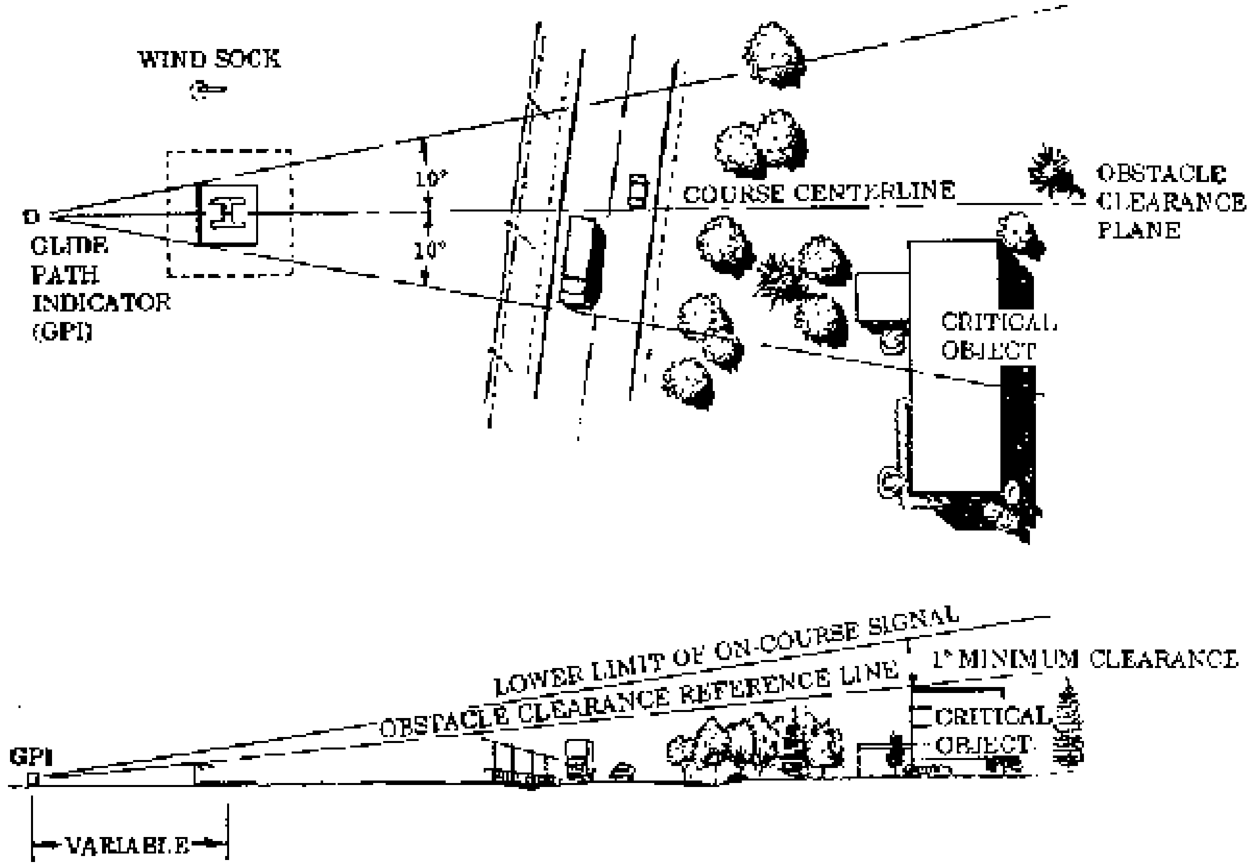



**Figure 3-12. Visual glide path indicator siting and clearance criteria**

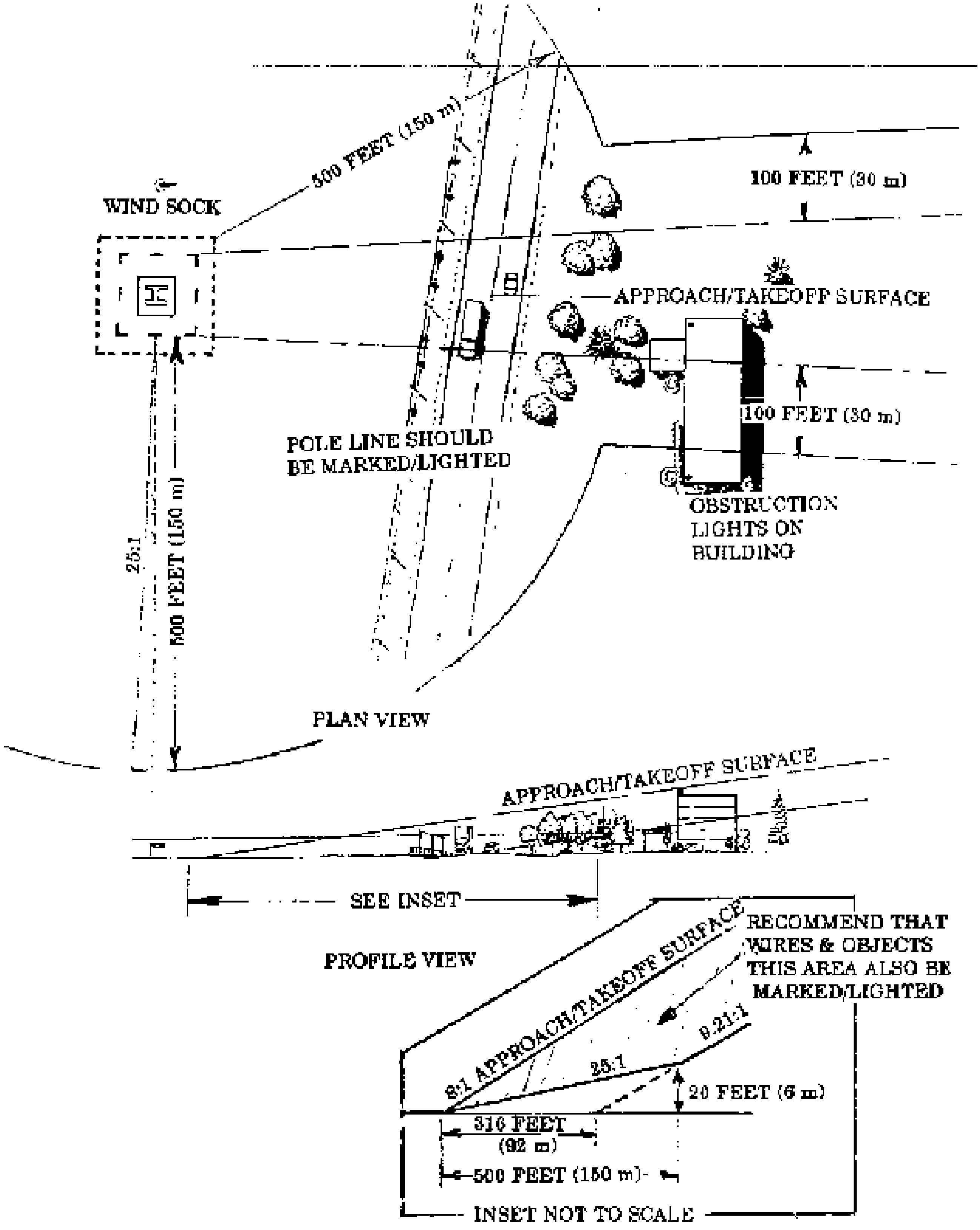



Figure 3-13. Recommended area for wire marking and/or lighting

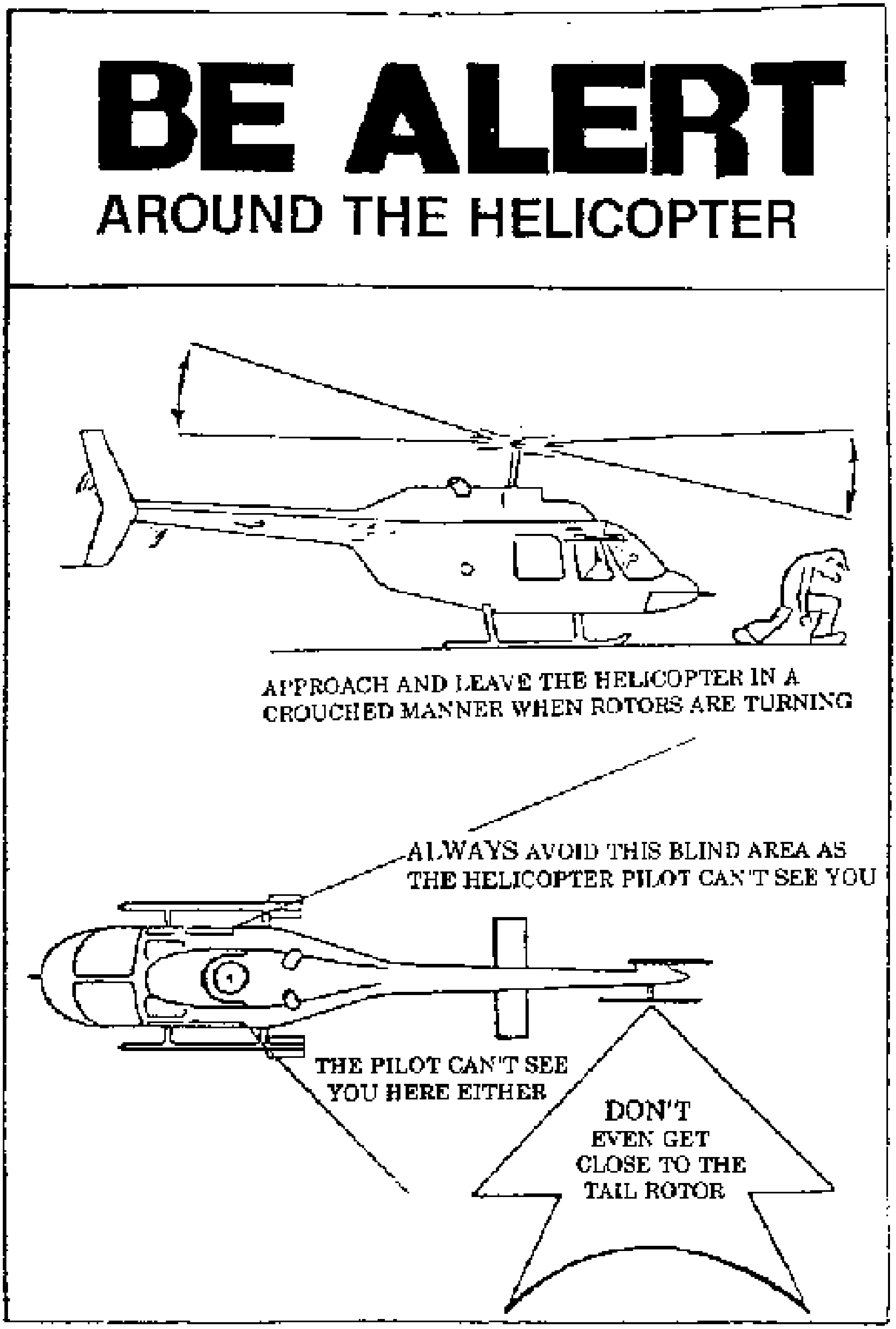



Figure 3-14. Caution sign

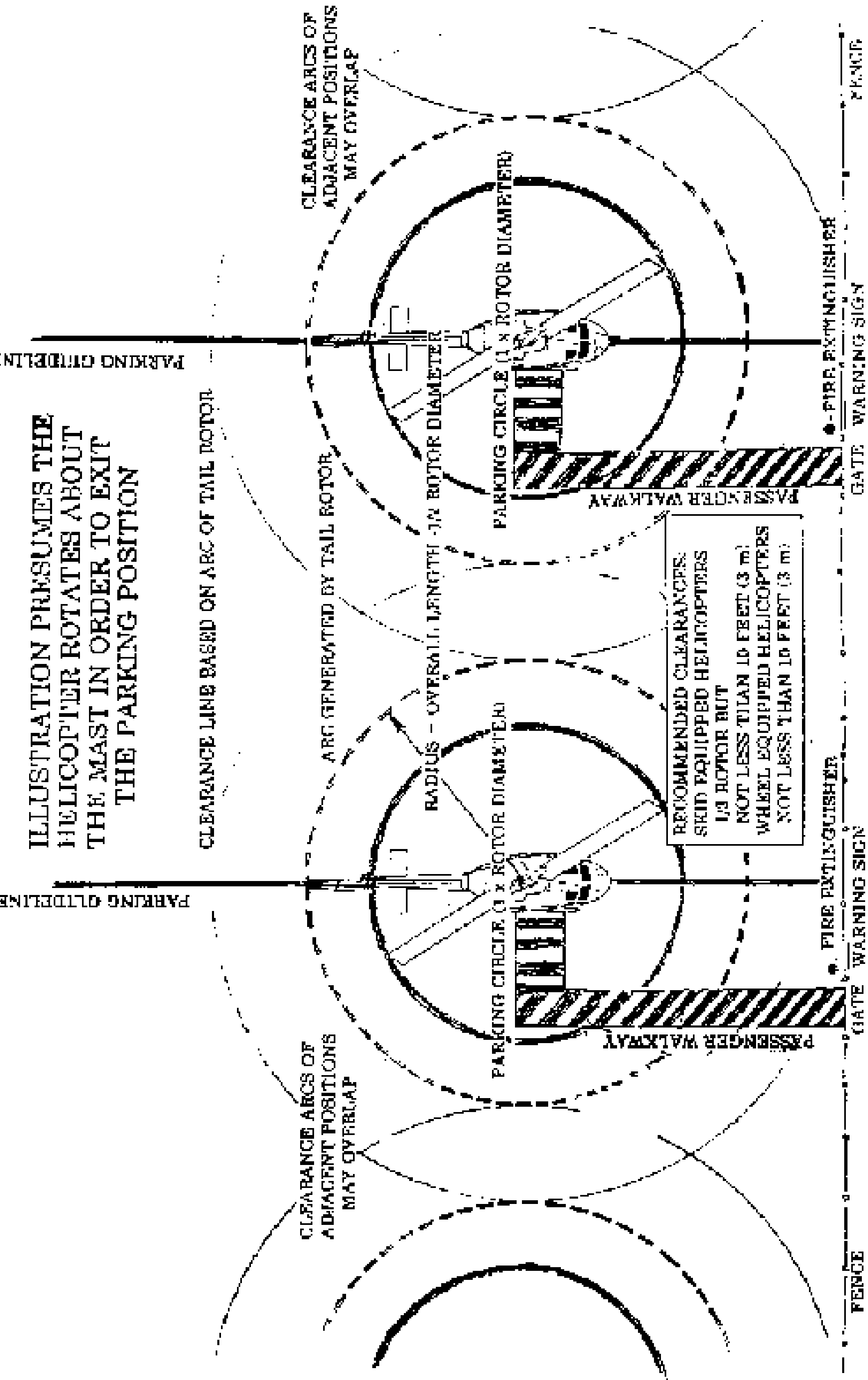



Figure 3-15. Apron parking position clearances

# CHAPTER 4. TRANSPORT HELIPORTS

**38. GENERAL.** A transport heliport is available for use by the general public without a requirement for prior approval of the owner or operator and is intended to accommodate air carrier operators providing scheduled service with large helicopters. When the heliport is served by helicopters carrying more than 30 passengers, the heliport operator is required to have an FAA certificate issued under FAR Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers. Because of the need for all-weather operating capability, public agencies planning a transport heliport are encouraged to select a site capable of accommodating precision instrument operations. This chapter contains standards and recommendations for designing a transport heliport. Figure 4-1 illustrates the essential features of a transport heliport.

**NOTE:** *If operations by tilt rotor aircraft are contemplated, criteria in AC 150/5390-3, Vertiport Design is applicable.*

**39. FINAL APPROACH AND TAKEOFF AREA (FATO).** A transport heliport must have a FATO which may contain one or more touchdown liftoff areas-- locations within the FATO at which arriving helicopters terminate the approach and from which departing helicopters takeoff.

**a. Location.** The FATO of a transport heliport is normally at ground level but may be developed with the TLOF located on a pier, or when carefully planned, on the roof of a building. Figure 4-2 depicts a FATO extending over water.

**b. Size.** FATOs are normally rectangles with the long axis aligned with the prevailing wind. FATO width is based on the rotor diameter of the design helicopter. FATO length is based on the elevation of the heliport site above mean sea level.

**(1) FATO Width.** The minimum width of a FATO should be at least 2 rotor diameters of the design helicopter. A recommended FATO width of 100 feet (30 m) will accommodate the majority of large helicopters in the current fleet.

**(2) FATO Length.** The minimum recommended FATO length is 200 feet (60 m). For heliports at elevations of 1,000 feet (300 m) or more above mean sea level, an elongated FATO as determined from figure 4-3 is recommended. The elongation should be in the direction of takeoff. Figure 4-3 depicts recommended FATO lengths.

**c. Gradients.** The turf portions of a FATO should be graded to remove surface irregularities and assure drainage. Longitudinal gradients should match those of the paved touchdown and liftoff surface (TLOF). To insure drainage, a shoulder with gradients ranging between 2 and 5 percent should exist along the TLOF edge.

**40. SAFETY AREA.** A safety area not less than 30 foot (9 m) in width surrounds the FATO. The FATO and the safety area must be free and clear of objects such as parked helicopters, buildings, fences, etc. which could be struck by the main or tail rotor, or catch the skids, of an arriving or departing helicopter.

**41. TOUCHDOWN AND LIFT-OFF AREA (TLOF).** TLOFs are rectangular paved surfaces centered on the major axis of the FATO. For irregularly shaped or oversized FATOs, the center of the TLOF is located at least the rotor diameter of the design helicopter in from the FATO boundaries. Figure 4-4 illustrates this FATO/TLOF relationship.

**a. Size.** The minimum dimension of a the TLOF shall not be less than the rotor diameter of the design helicopter or 50 feet (15 m).

**b. Surface Characteristics.** A Portland Cement Concrete (PCC) surface is recommended for ground level heliports. An asphaltic surface is "less desirable" for heliports as it may rut under the wheels or skids of a parked helicopter, a possible factor in some roll-over incidents. Pavements should have a broomed or other roughened finish that provides a skid resistant surface for helicopters and non-slippery footing for persons. Pavements should be designed to support 1.5 times the maximum takeoff weight of the design helicopter.

**c. Gradients.** To assure drainage, the TLOF should have a maximum longitudinal gradient of 0.5 percent and a transverse gradient between 0.5 and 2.0 percent. 42. APPROACH/TAKEOFF SURFACE.

**a. Approach/Takeoff Path.** A transport heliport should have more than one approach/takeoff path. A path should be oriented to align with the direction of the predominant wind during visual conditions and, to the extent practicable, an other with the prevailing winds during instrument conditions. Visual approach/takeoff paths may curve to avoid objects, noise sensitive areas, and/or utilize the airspace above public lands e.g. freeways, rivers, etc.

**b. Approach/Takeoff Surface.** An approach/ takeoff surface is centered on each approach/takeoff path. The visual approach/takeoff surface conforms to the dimensions of the FAR Part 77 heliport approach surface. Figure 1-6 illustrates the heliport approach and transitional surfaces which must be free of hazards to air navigation. Paragraph 8 provides guidance on how to identify and mitigate hazards to air navigation. The approach/takeoff surface centered on the path aligned with the prevailing winds during instrument conditions should comply with the obstacle evaluation surfaces criteria cited in chapters 7 and 8.

**43. PROTECTION ZONE.** The protection zone is the property under lying the approach/takeoff surface out to where the surface is 35 feet (10.5 m) above the heliport elevation as illustrated in figure 4-5. The heliport proponent should own or control this property. The control should include the ability to clear incompatible objects and to preclude activities that contribute to the congregation of people.

**44. TAXI ROUTES AND TAXIWAYS.** A taxi route is both an object free right-of-way connecting the FATO to a parking area/apron, and a maneuvering aisle on the parking area/apron. Taxiways are paved surfaces, normally centered in a taxi route, used by helicopters in ground maneuvering. The relationship between taxi routes and paved taxiways is illustrated in figure 4-6.

**a. Widths.**

**(1) Taxi Routes.** The width of a taxi route is determined by adding the clearance specified in "b" below to the maximum rotor diameter of the helicopter that will hover or ground taxi.

**(2) Taxiways.** The width of paved taxiway should be at least twice the undercarriage width of the design helicopter.

**b. Clearances.** Taxi routes and taxiways should provide the design helicopter with 20 feet (6 m) of rotor tip clearance for hover taxiing and 10 feet (3 m) clearance for ground taxiing.

**c. Surfaces**. Unpaved portions of taxi routes should have a turf cover, or be treated in some manner, to prevent dirt and debris from being raised by a taxiing helicopter's rotor wash. Taxiways may have an asphaltic, portland cement, or other stabilized surface. Taxiway pavements should be capable of sustaining the maximum gross weight of the design helicopter under all weather conditions.

**d. Gradients.** Taxiway longitudinal gradients should not exceed 2.0 percent. Transverse gradients should not be less than 0.5 percent nor greater than 2.0 percent.

**45. HELICOPTER PARKING.** A transport heliport should have a paved apron for parking helicopters. The size of the apron depends upon the number of helicopters to be accommodated. Separate aprons may be established for specific functions such as passenger boarding, maintenance, and parking of based and transient helicopters. Parking positions should be designed to accommodate the range of helicopter sizes expected at the facility.

**a. Size.** Parking position size is dependent upon the helicopter size and the intended paths in maneuvering in and out of the parking position. There should be at least 1/3 rotor, but not less than 10 feet (3 m), of clearance between skid equipped helicopters and at least 10 feet (3 m) for wheel equipped helicopters to another helicopter or object. Clearances are measured from any part of a helicopter with the helicopter on the intended path. Tail rotor clearance may become the critical clearance when the helicopter turns 30 degree or more within a parking position. Figure 4-7 illustrates this design principle.

**b. Fueling.** AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing on Airports, contains guidance on fueling services. Systems for storing and dispensing fuel must conform to federal, state, and local requirements for petroleum handling facilities. Guidance is found in AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing on Airports, and appropriate National Fire Protection Association (NFPA) publications. Fueling locations should be designed and marked to minimize the potential for helicopters to collide with the dispensing equipment. The area should be lighted if night fueling operations are contemplated.

**c. Additional Apron.** Additional area may be required adjacent to hangars used by private helicopter owners and for hangars and other structures used by fixed base operators.

**d. Tie Downs.** Recessed tie downs may be installed to accommodate extended or over night parking of based or transient helicopters. Guidance on recessed tie downs recommended for extended or overnight parking is found in AC 20-35, Tiedown Sense.

**46. HELIPORT MARKERS AND MARKINGS.** Markers and/or surface markings identify the facility as a heliport, the perimeter of the FATO and TLOF, any taxi route, taxiway, and/or parking positions. Surface markings/lines may be paint or preformed material. Heliport FATOs and TLOFs are defined with in-ground markers and/or white lines. Taxi routes are defined with raised edge markers. Taxiways and aprons are defined with yellow lines/markings. Lines/markings may be outlined with a 6 inch (15 cm) wide stripe of a contrasting color to enhance conspicuity.

**a. Perimeter Markings.** The perimeter of the FATO and/or TLOF should be defined with markers and/or lines. Figure 4-8 illustrates a heliport with in-ground markers and surface markings while figure 4-9 illustrates a heliport with surface markings.

**(1) Unpaved FATOs.** The perimeter of an unpaved FATO is defined with in-ground markers, approximately 1 foot by 5 foot (30 cm by 1.5 m) located at the corners and along the FATO edges.

**(2) Paved FATOs.** A 1 foot (30 cm) wide dashed white line defines the FATO perimeter. The segments and separation between segments should be even. The corners must be defined and the edge segments should be approximately 5 feet (1.5 m) in length.

**(3) TLOFs.** A continuous 12 inch (30 cm) wide solid white line defines the perimeter of a paved or a hard surfaced TLOF.

**b. Identification Marking.** Transport heliports are identified by the white capital letter H centered on the TLOF as illustrated in figures 4-8 and 4-9. The H is oriented on the axis of the dominate approach/takeoff path. Appendix 2 contains dimension recommendations.

**c. Closed Heliport.** All markings of a permanently closed heliport, FATO, or TLOF should be obliterated. If it is impracticable to obliterate markings, a yellow X, as illustrated in figure 4-10, should be placed over the H. The yellow X must be large enough to ensure early pilot recognition that the heliport is closed.

**d. Taxi Routes and Taxiway Markings.** Taxi route edges are defined with yellow-blue-yellow raised markers that are not more than 8 inches (20 cm) in height nor less than 4 inches (10 cm) in diameter. Taxiway centerlines and edges are marked with lines. The centerline is a continuous 6 inch (15 cm) wide yellow line. The edges are defined with two continuous 6 inch (15 cm) wide yellow lines spaced 6 inches (15 cm) apart. Figure 4-6 illustrates taxi route and taxiway centerline and edge markings.

**e. Apron Markings.** In addition to the taxiway and parking position markings, the yellow (double) taxiway edge lines continue around the apron to define the apron edge. Figure 4-7 illustrates apron markings.

**f. Parking Position Markings.** The yellow taxiway centerline continues into the individual parking positions to define the centerline of the parking positions. A parking position is further identified by a 12 inch (30 cm) wide yellow line defining a circle. The diameter of the circle is equal to the rotor diameter of the largest helicopter the position is designed to accommodate. The spacing between circles, and a circle and an object depends upon how much the helicopter must turn to exit the position. Refer to paragraph 45.a.

**47. HELIPORT LIGHTING.** For night operations, the TLOF and taxiways (or taxi routes) need to be lighted. Yellow lights define the limits of the TLOF. Green lights define taxi route and taxiway centerlines. Alternatively, blue lights may be used to define taxiway and taxi route edges. Figure 4-11 illustrates these lighting systems. AC 150/5340-19, Taxiway Centerline Lighting System, AC 150/5340-24, Runway and Taxiway Edge Lighting System, and AC 150/5345-46, Specification for Runway and Taxiway Light Fixtures, contain technical guidance on lighting equipment and installation details.

**a. Perimeter Lights.** A minimum of 5 lights are recommended per side or end of the TLOF. A light is located at each corner with additional lights uniformly spaced between the corner lights with a maximum interval of 25 feet (7.5 m) between lights. Flush lights may be located on, or within 1 foot (3 cm) of, the TLOF edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, may be located 10 feet (3 m) out from the TLOF edge and should not penetrate a horizontal plane at the TLOF's elevation by more than 2 inches (5 cm).

**b. Landing Direction Lights.** An optional feature, landing direction lights, is a configuration of five L-861 lights fitted with omni-directional yellow lenses. The lights are spaced at 15 foot (4.5 m) intervals beginning at the line of perimeter lights and extending outward in the direction of the preferred approach/takeoff path as illustrated in figure 4-11.

**c. Taxiways.** Taxiway centerlines are defined with flush bi-directional or uni-directional green lights. Alternatively, taxiway edges may be marked with blue taxiway edge lights. Lights are spaced at 50 feet (15 m) intervals on straight sections and at 25 feet (7.5 m) intervals on curved sections with a minimum of four lights needed to define the curve. Green retro-reflective markers meeting requirements for Type II markers in AC 150/5345-39, FAA Specification L-853, Runway and Taxiway Centerline Retro-reflective Markers, may be used in lieu of the centerline lighting fixtures. Blue retro- reflective markers may be used in lieu of edge lights.

**d. Heliport Identification Beacon.** A heliport identification beacon is recommended to aid in locating the heliport. The beacon, flashing white/green/yellow at the rate of 30 to 45 flashes per minute, should be located on or close to the heliport. Guidance on heliport beacons is found in AC 150/5345-12, Specification for Airport and Heliport Beacon.

**e. Floodlights.** Floodlights may be used to illuminate the apron area. Care should be taken to place floodlights clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces and not interfere with pilot vision.

**48. WIND DIRECTION INDICATOR.** A wind sock conforming to AC 150/5345-27, Specification for Wind Cone Assemblies, is recommended to show the direction and magnitude of the wind. Wind socks must be lighted for night operations. The wind sock should be placed where it provides a true indication of surface wind and is clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces. The wind sock should provide the best possible color contrast to its background. When the heliport is large or located among buildings, wind direction and speed may differ significantly from one part of the heliport to another and multiple wind socks may be necessary.

**49. VISUAL GLIDE PATH INDICATORS.** A visual glide path indicator, such as Heliport Approach Path Indicator (HAPI), Visual Approach Slope Indicator (VASI), or Precision Approach Path Indicator (PAPI), provides pilots with visual course and descent cues. The lowest on course visual signal must provide a minimum of 1 degree of clearance over any object in the approach path that lies within 10 degrees of the approach course centerline. The optimum location of a visual glide path indicator is on the extended centerline of the approach path at a distance that brings the helicopter to a hover 3 to 8 foot (0.9 to 2.5 m) above the TLOF. Figure 4-12 illustrates visual glide path indicator clearance criteria. AC 150/5345-28, Precision Approach Path Indicator (PAPI) Systems, and AC 150/5345-52, Generic Visual Glideslope Indicators (GVGI), provide additional information.

**50. TERMINAL FACILITIES.** The heliport terminal requires curb side access for passengers using private autos, taxicabs, and public transit vehicles. Public waiting areas need the usual amenities and a counter for rental car services may be desirable. Passenger auto parking areas should accommodate current requirements and have the capability of being expanded to meet future requirements. Readily available public transportation may reduce the requirement for employees and service personnel auto parking spaces. The heliport terminal building or sheltered waiting area should be attractive and functional. AC 150/5360-9, Planning and Design of Airport Terminal Facilities at Non-Hub Locations, contains guidance on designing terminal facilities.

**51. SAFETY CONSIDERATIONS.** The following safety related features should be provided on an as needed basis.

**a. Wire Marking And Lighting.** Unmarked electric and telephone wires in the heliports immediate area may be difficult to see. It is recommended that, where practical, wires located within 500 feet (150 m) of the FATO, as well as those within 1/2 mile (1 km) that are beneath and up to 100 feet (30 m) to the side of an approach/takeoff path be marked to make them more conspicuous. Figure 4-13, illustrates the area of concern. Guidance on marking and lighting objects is contained in AC 70/7460-1, Obstruction Marking and Lighting.

**b. Security.** Ground level heliports may require their operational areas to be fenced to prevent the inadvertent or unauthorized entry of persons or vehicles. Fences should be as low as possible and located as far as possible from the FATO. Fences should not penetrate any approach/takeoff or transitional surface. Access to air side areas should be through controlled and locked gates or doors. Gates and doors should display a cautionary sign similar to that illustrated in figure 4-14.

**c. Rescue and Fire Fighting Services.** Rescue and fire fighting service requirements vary. Public use utility heliports should meet (NFPA) Pamphlet 418, Standards for Heliports, or (NFPA) Pamphlet 403, Aircraft Rescue Services, criteria. A fire hose cabinet or extinguisher should be provided at each access gate and each fueling location.

**d. Equipment/Object Marking.** Heliport maintenance and servicing equipment as well as other objects used in airside operational areas should be made conspicuous with reflective tape, paint, or other markings. Particular attention should be given to marking objects that are hard to see in marginal visibility such as at night, in mist, or fog.

**e. Passenger Walkways.** Passenger movement in operational areas should be restricted to marked walkways. Figure 4-15 illustrates one marking scheme. Apron pavements should be designed so that spilled fuel does not drain onto passenger walkways or toward parked helicopters.

**f. Communication and Weather Information.** A UNICOM radio may be used to provide arriving helicopters with heliport and traffic advisory information but may not be used to control air traffic. The Federal Communications Commission (FCC) should be contacted for information on UNICOM licensing. An AWOS measures and automatically broadcasts current weather conditions at the heliport site. When an AWOS is installed, it should be located at least 100 feet (30 m) and not more than 700 feet (215 m) from the edge of the TLOF. Locate the AWOS to avoid heliport surfaces subject to rotor wash from helicopter operations. Guidance on AWOS systems is found in AC 150/5220-16, Automated Weather Observing Systems (AWOS) for Non- Federal Applications.

**g. Winter Operations**. Swirling snow raised by a landing helicopter's rotor wash can cause the pilot to loose sight of the intended landing point. Swirling snow on takeoff can hide objects which need to be avoided. The FATO and the safety area should be kept free of snow. Guidance on winter operations is found in AC 150/5200-30, Airport Winter Safety and Operations.

**52. ZONING AND COMPATIBLE LAND USE.** Where state statutes permit, a transport heliport sponsor is encouraged to develop and adopt the following zoning measures to ensure that the heliport will continue to be available for public use as well as to protect the community's investment in the facility.

**a. Zoning to Limit Building/Object Heights.** General guidance on drafting an ordinance which would limit building and object heights is contained in AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports. The locally developed ordinance should substitute the heliport surfaces for the airport surfaces described in model ordinance.

**b. Zoning for Compatible Land Use.** A zoning ordinance may be enacted, or an existing ordinance modified, to control the use of property within the heliports approach/takeoff path environment. The ordinance should restrict activities to those which are compatible with helicopter operations.

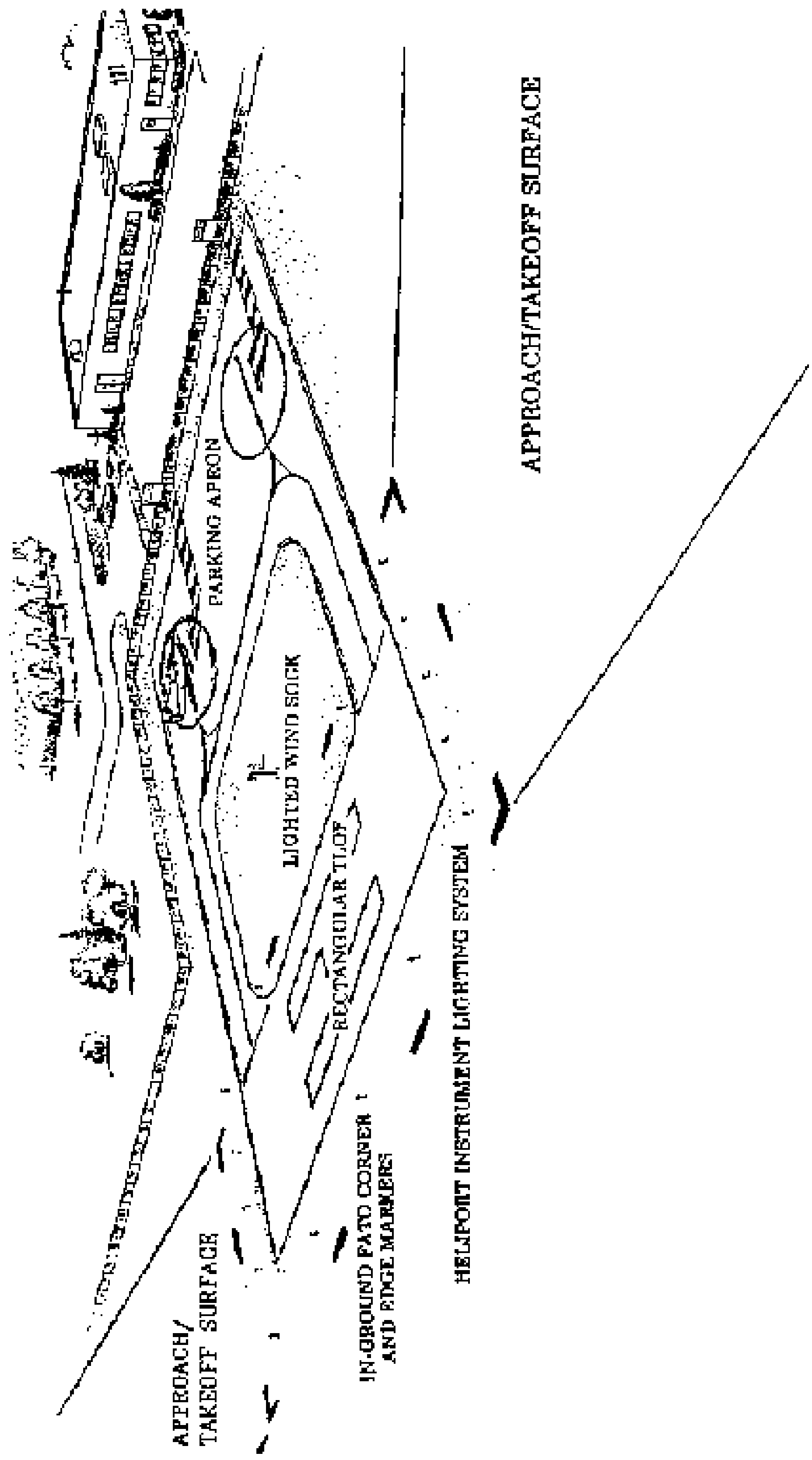



Figure 4-1. A typical transport heliport

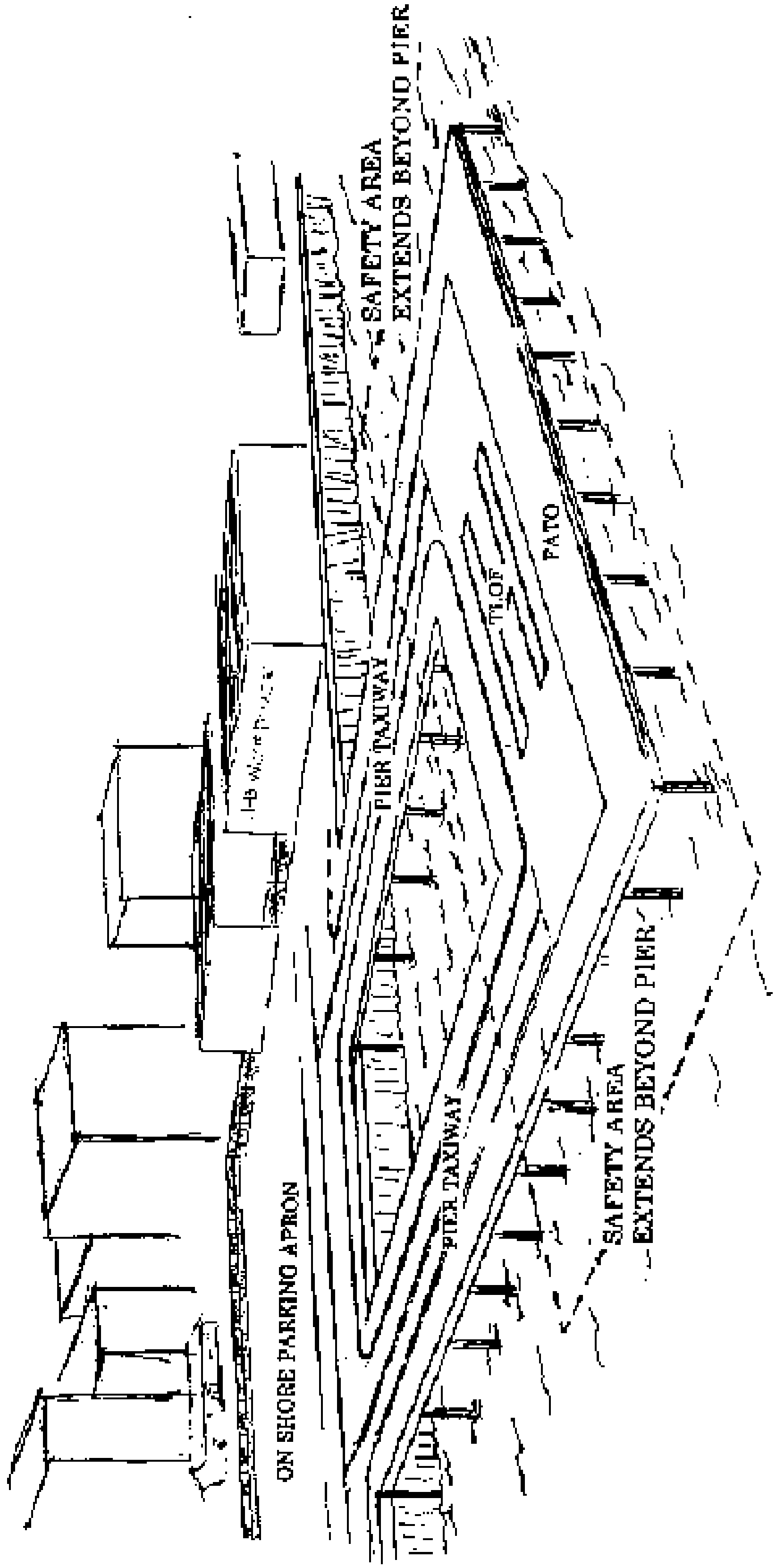



Figure 4-2. FATO extending over water

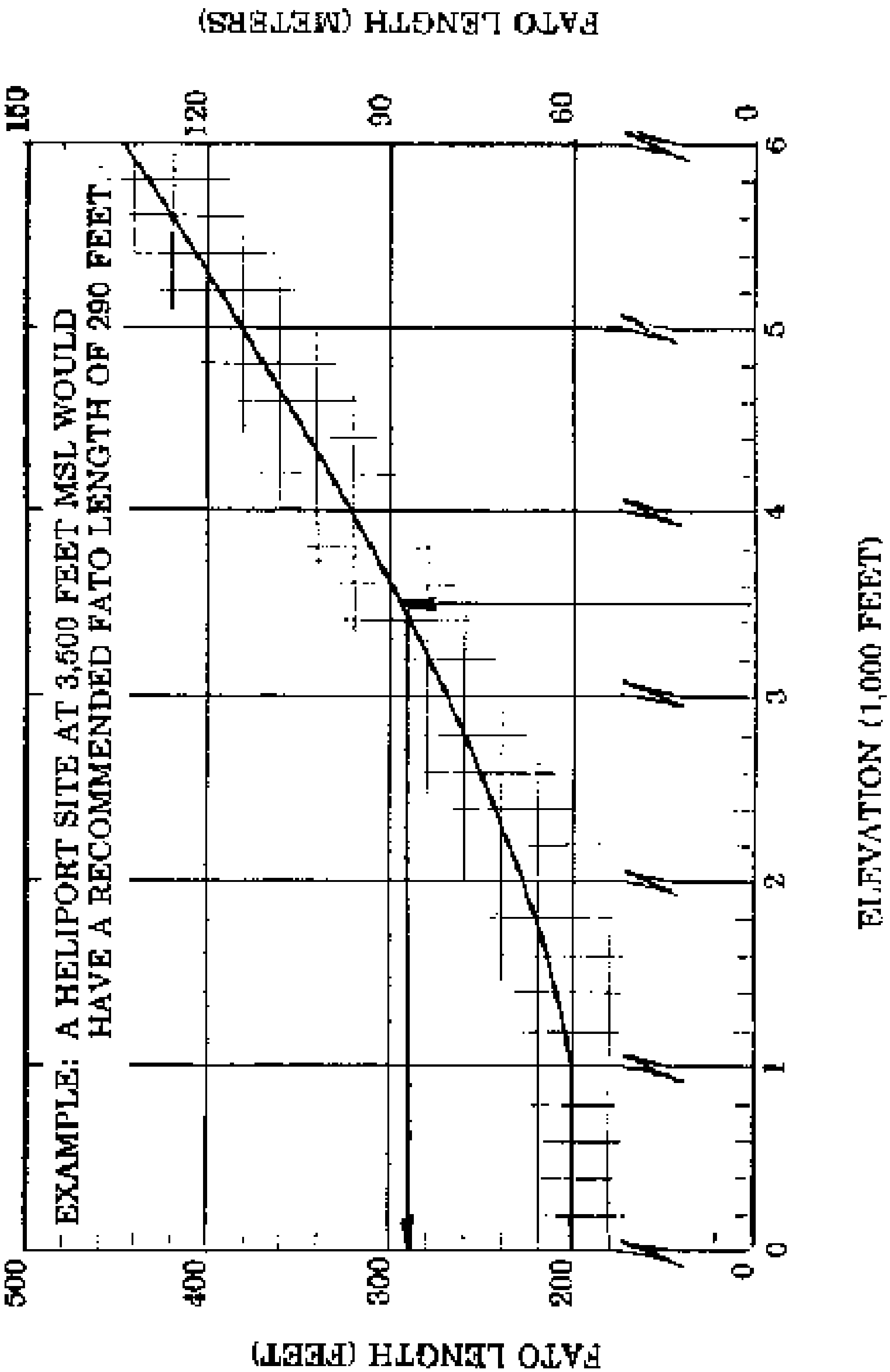



Figure 4-3. FATO length

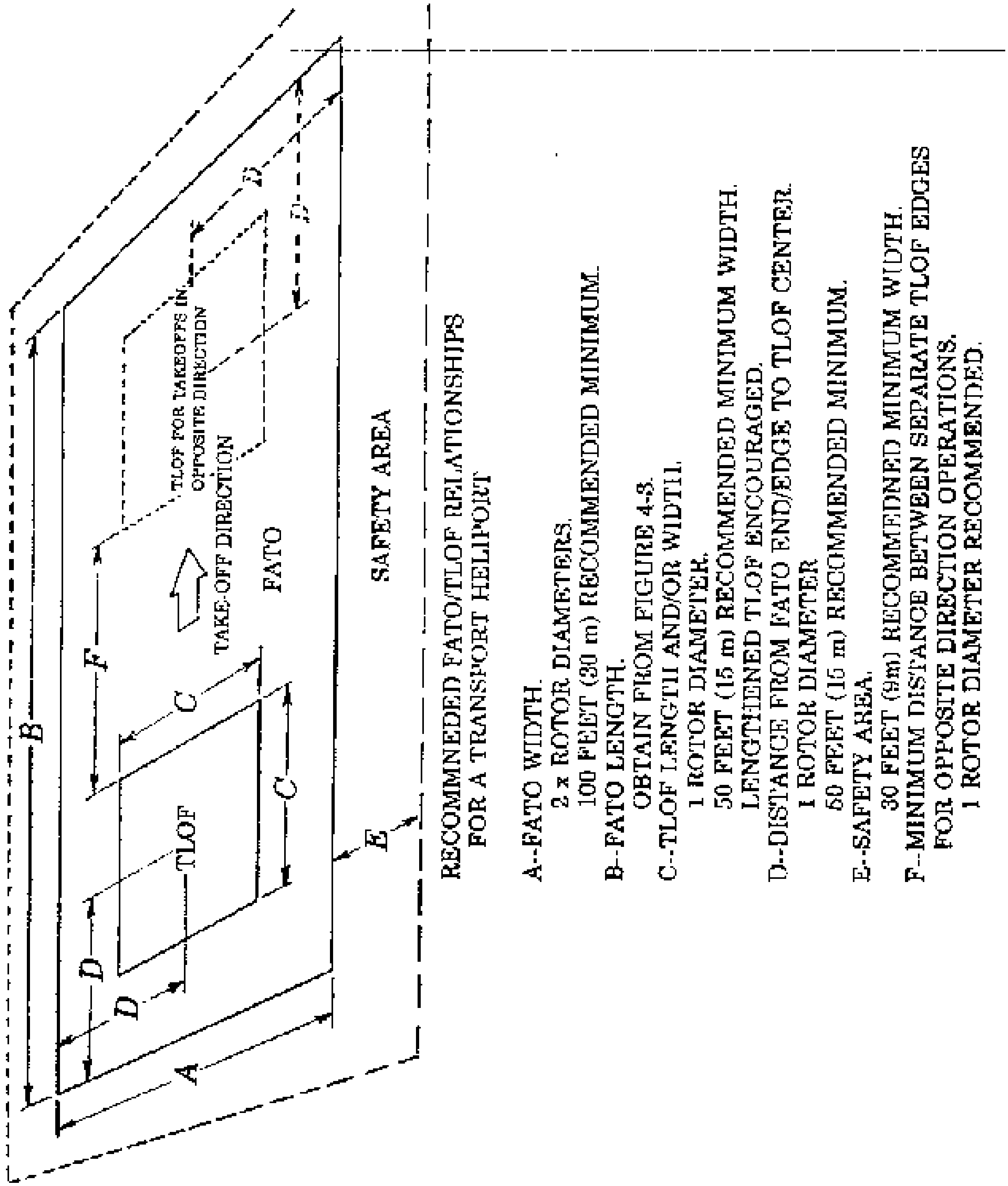



Figure 4-4. A FATO with two TLOFs

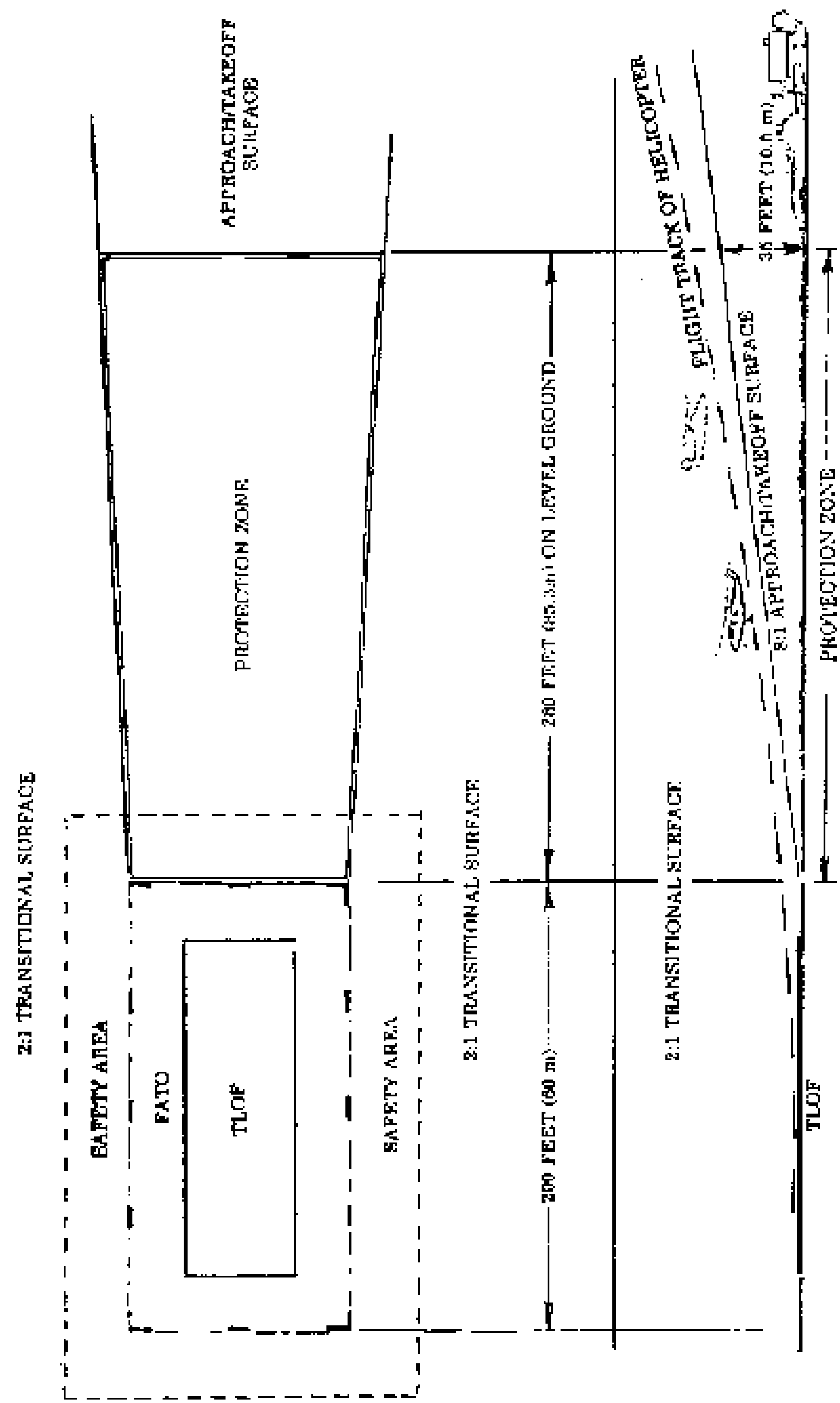



Figure 4-5. Protection zone

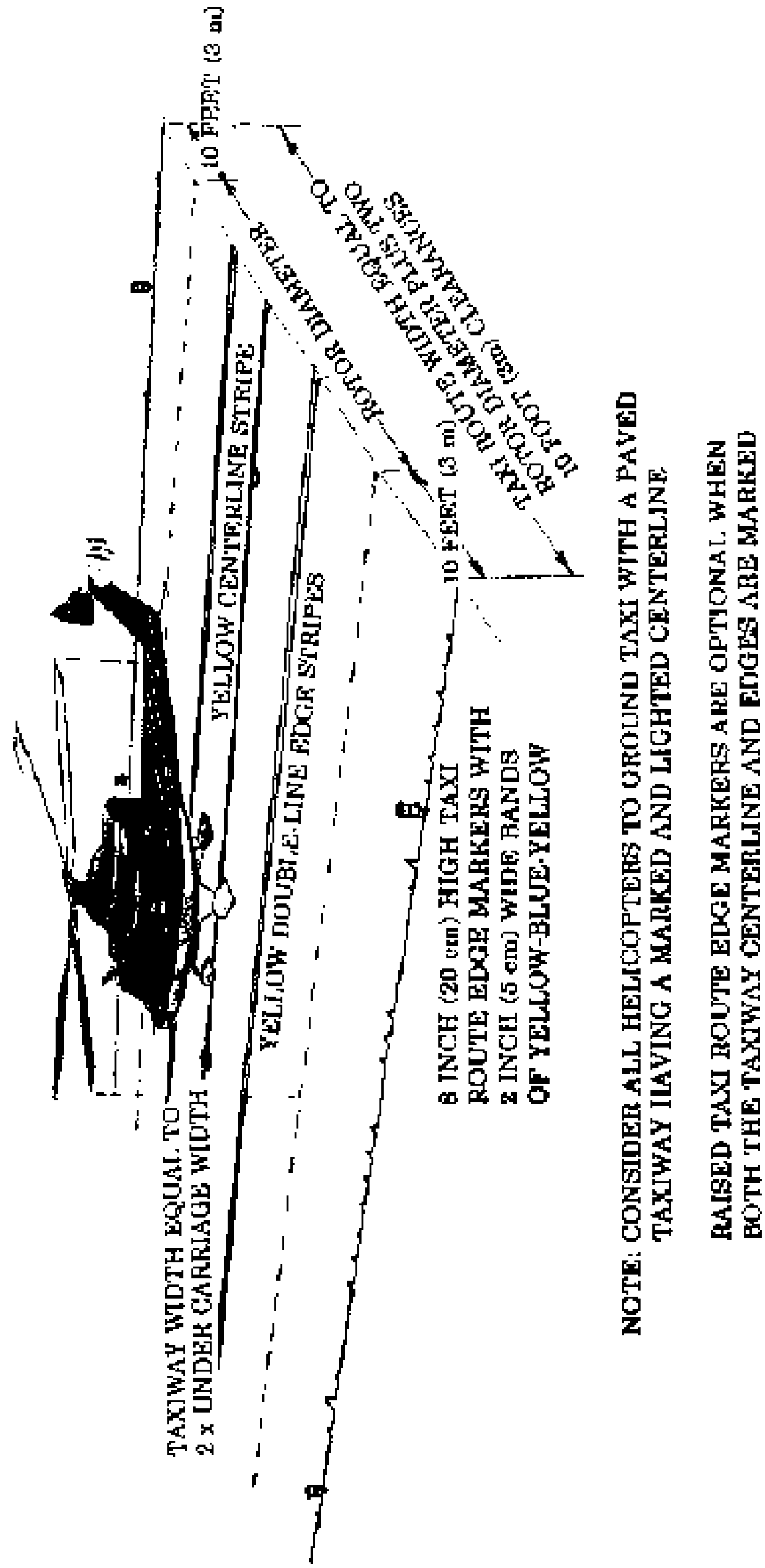



Figure 4-6. Taxi route taxiway relationship

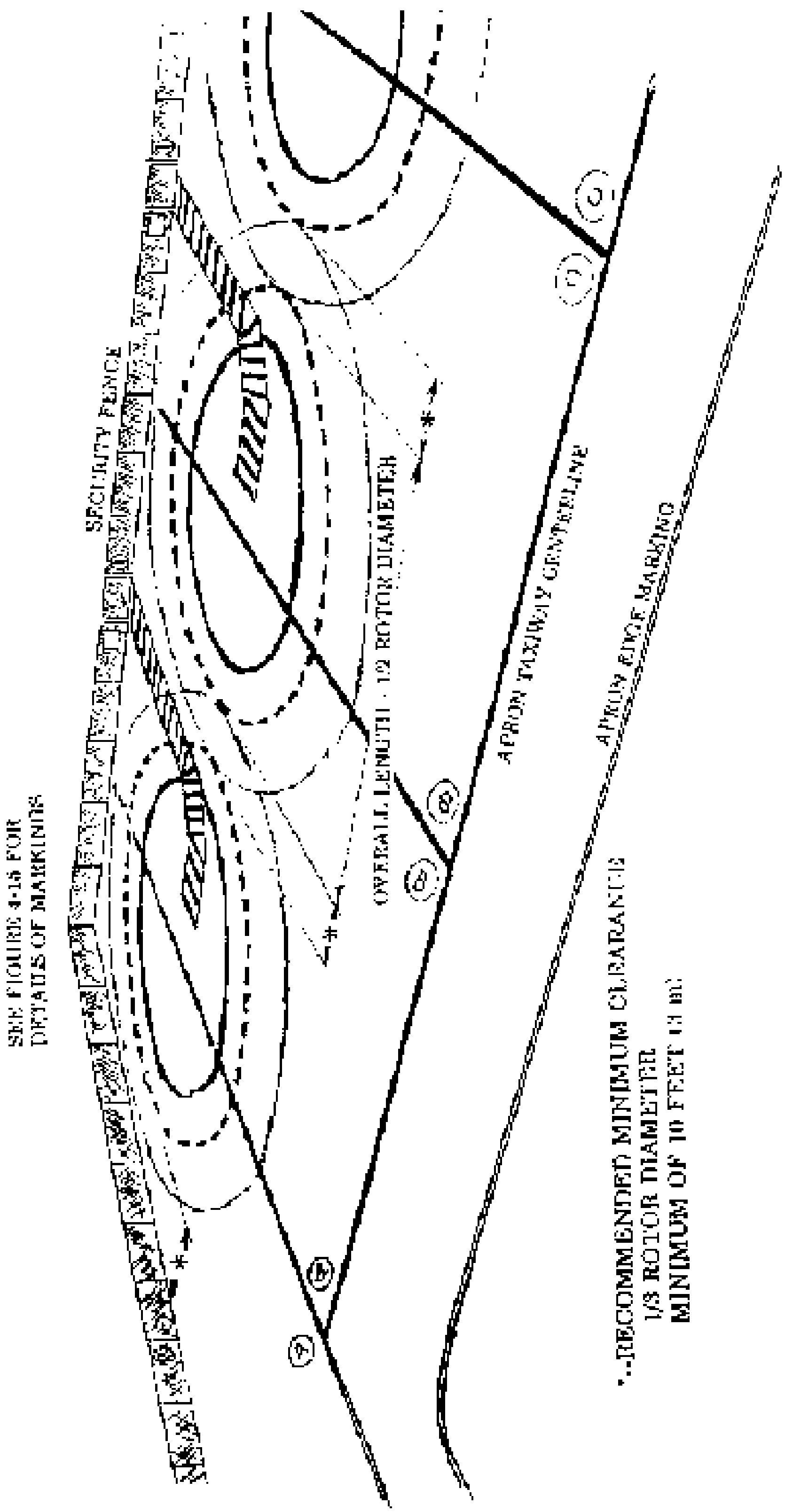



Figure 4-7. A transport heliport apron

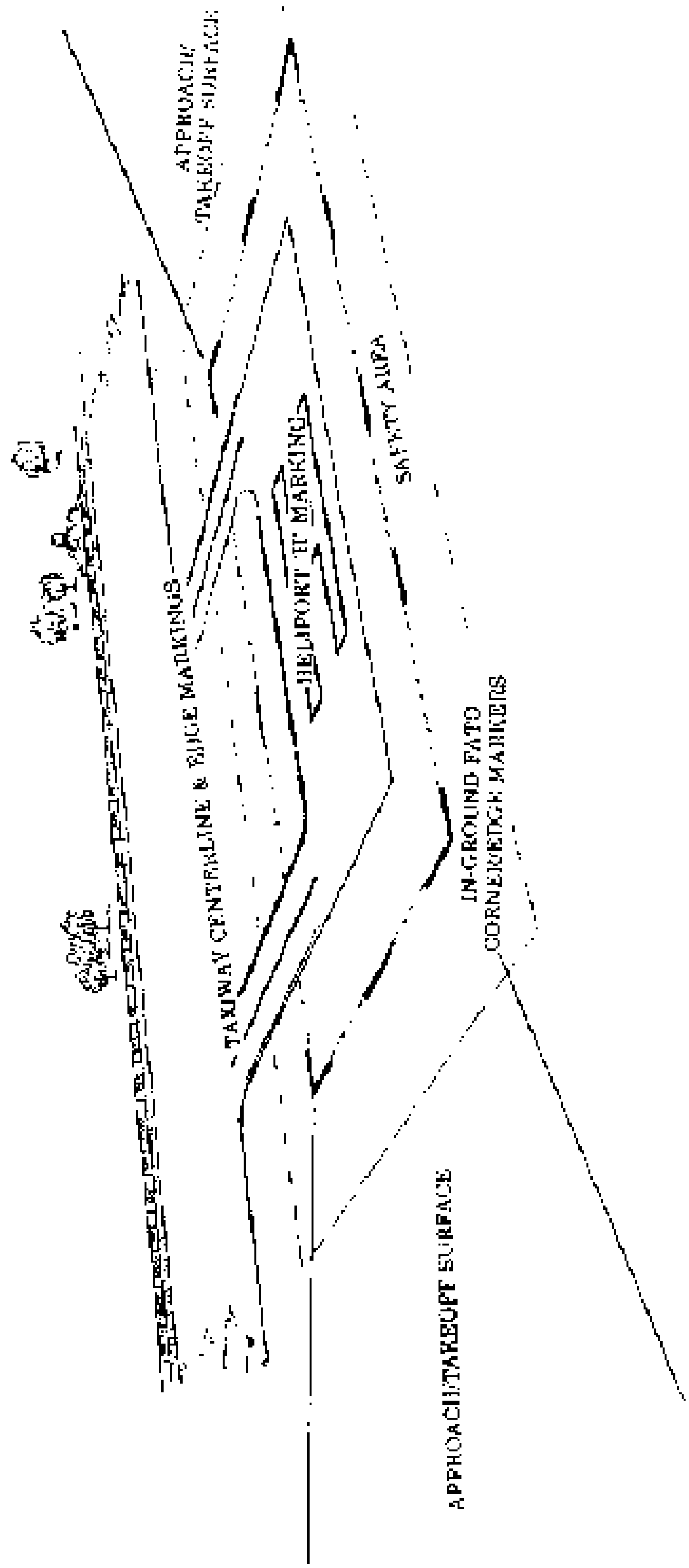



Figure 4-8. Heliport markers and markings

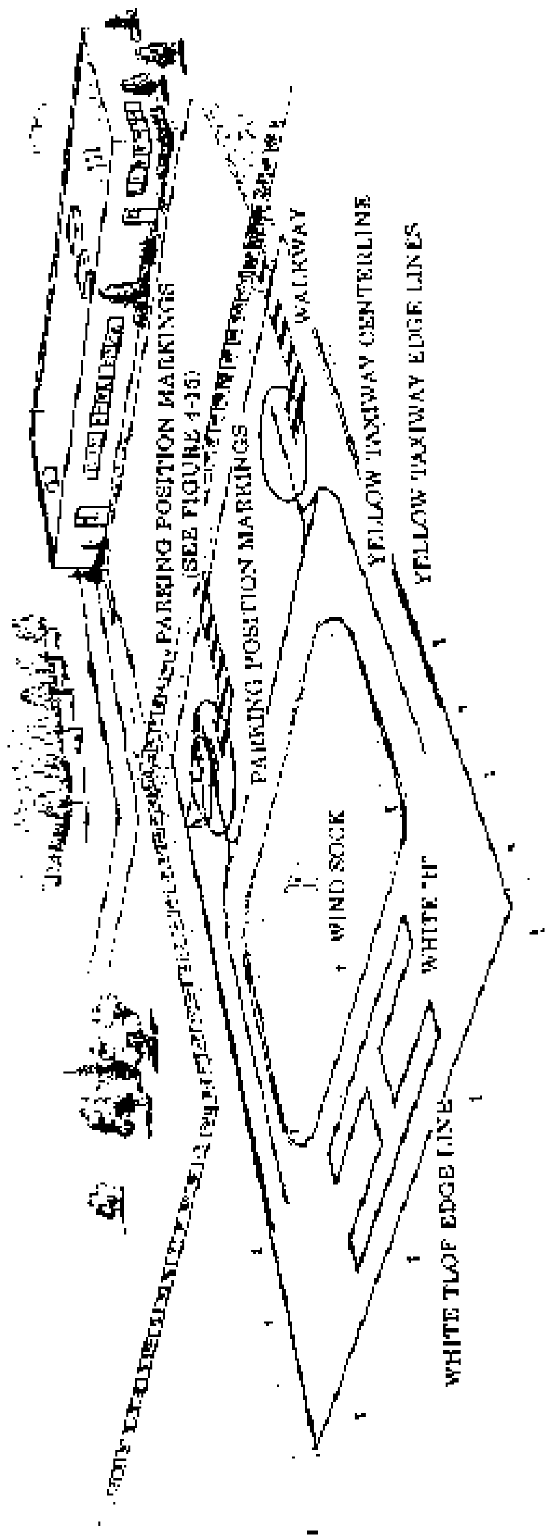



Figure 4-9. Heliport surface markings

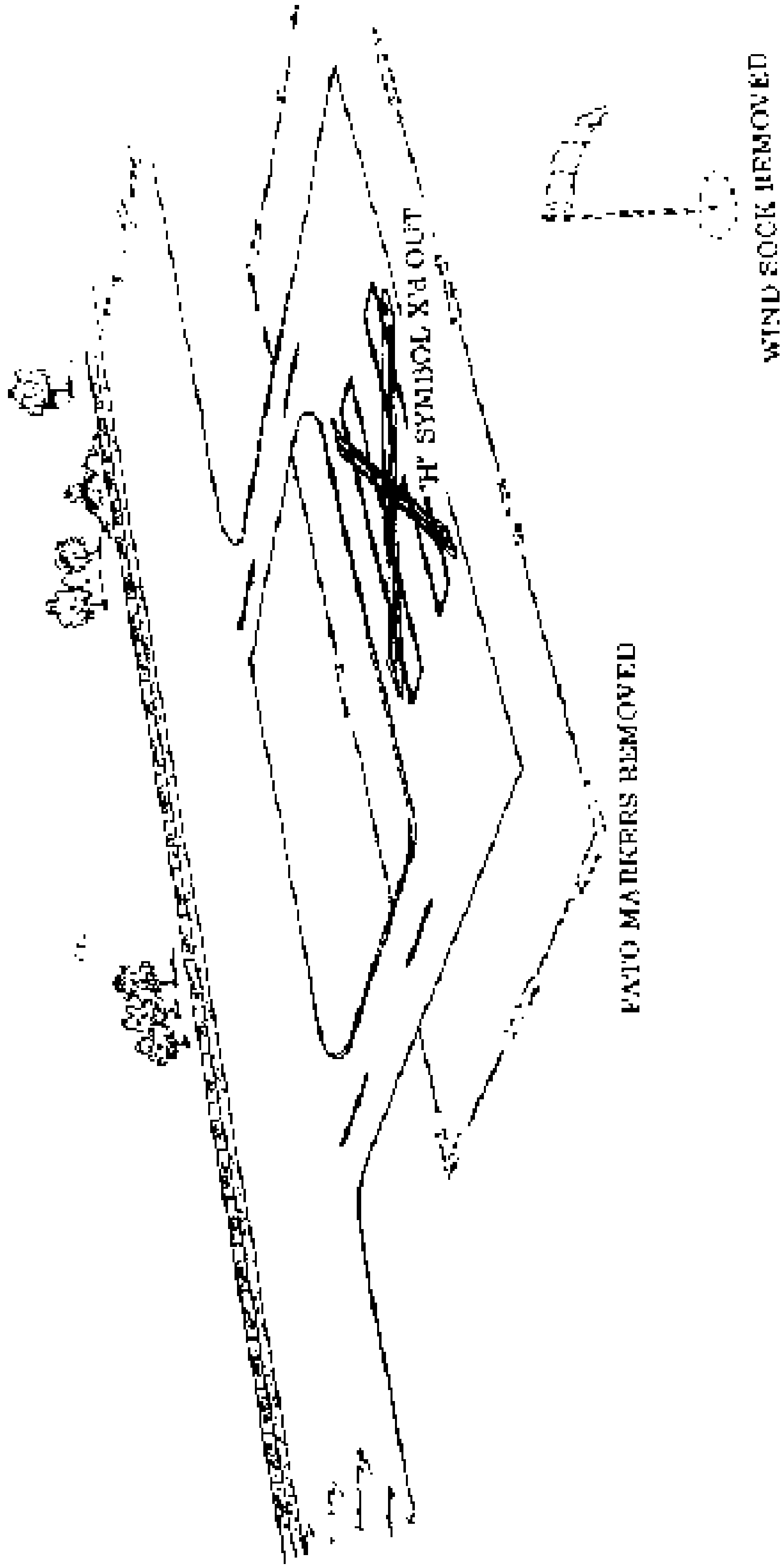



Figure 4-10. Marking a closed heliport

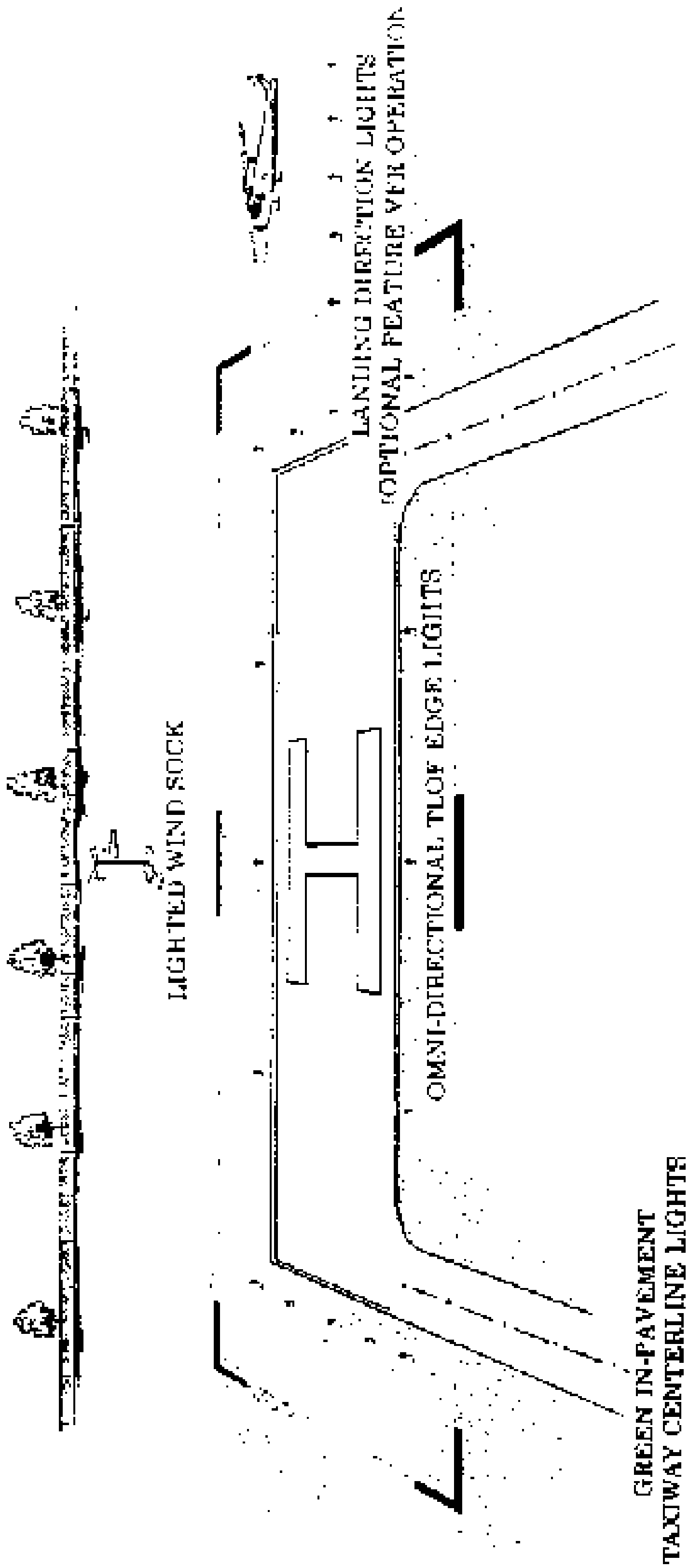



Figure 4-11. Lighting system for night operations

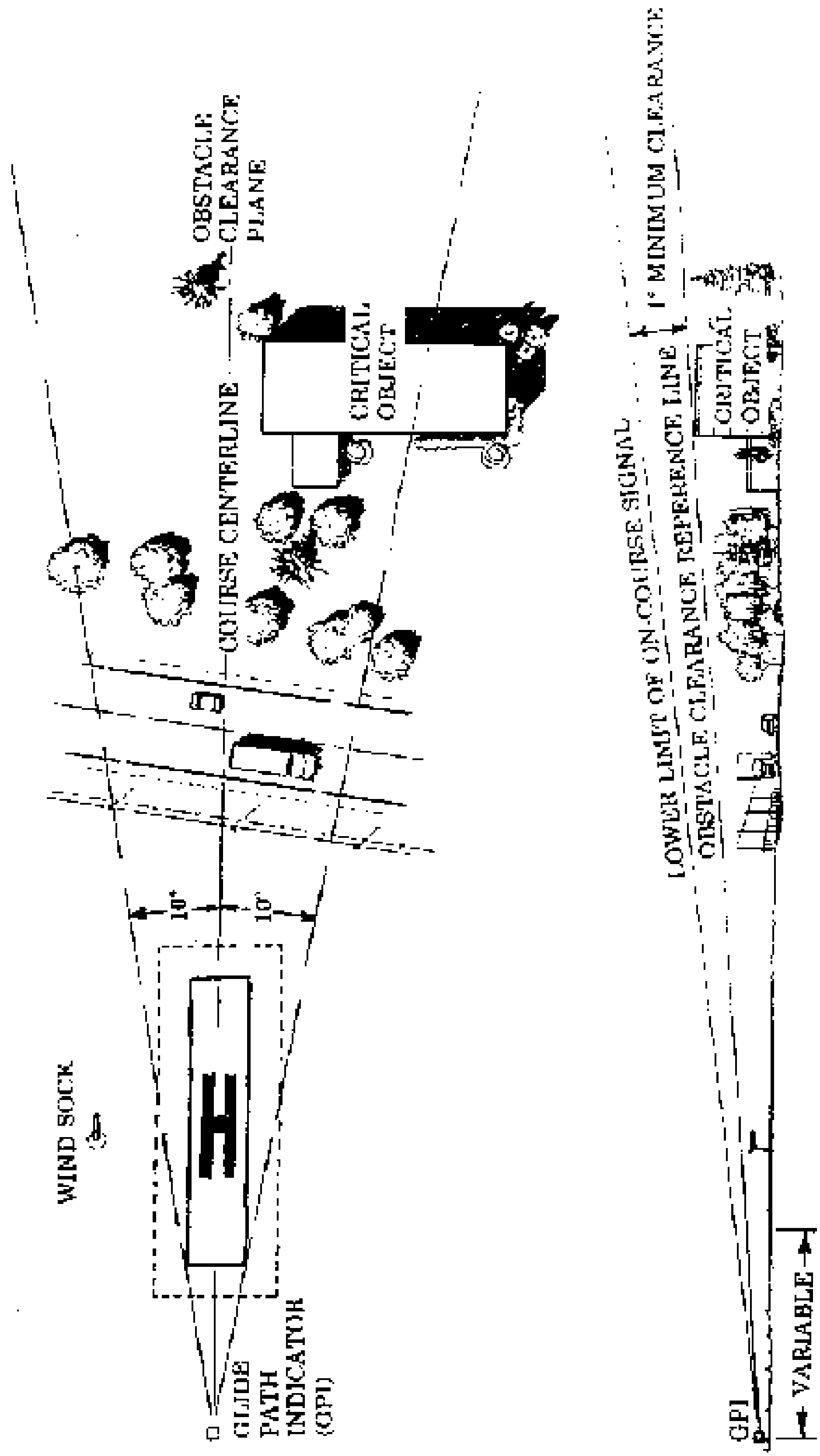



Figure 4-12. Visual glide path indicator siting and clearance criteria

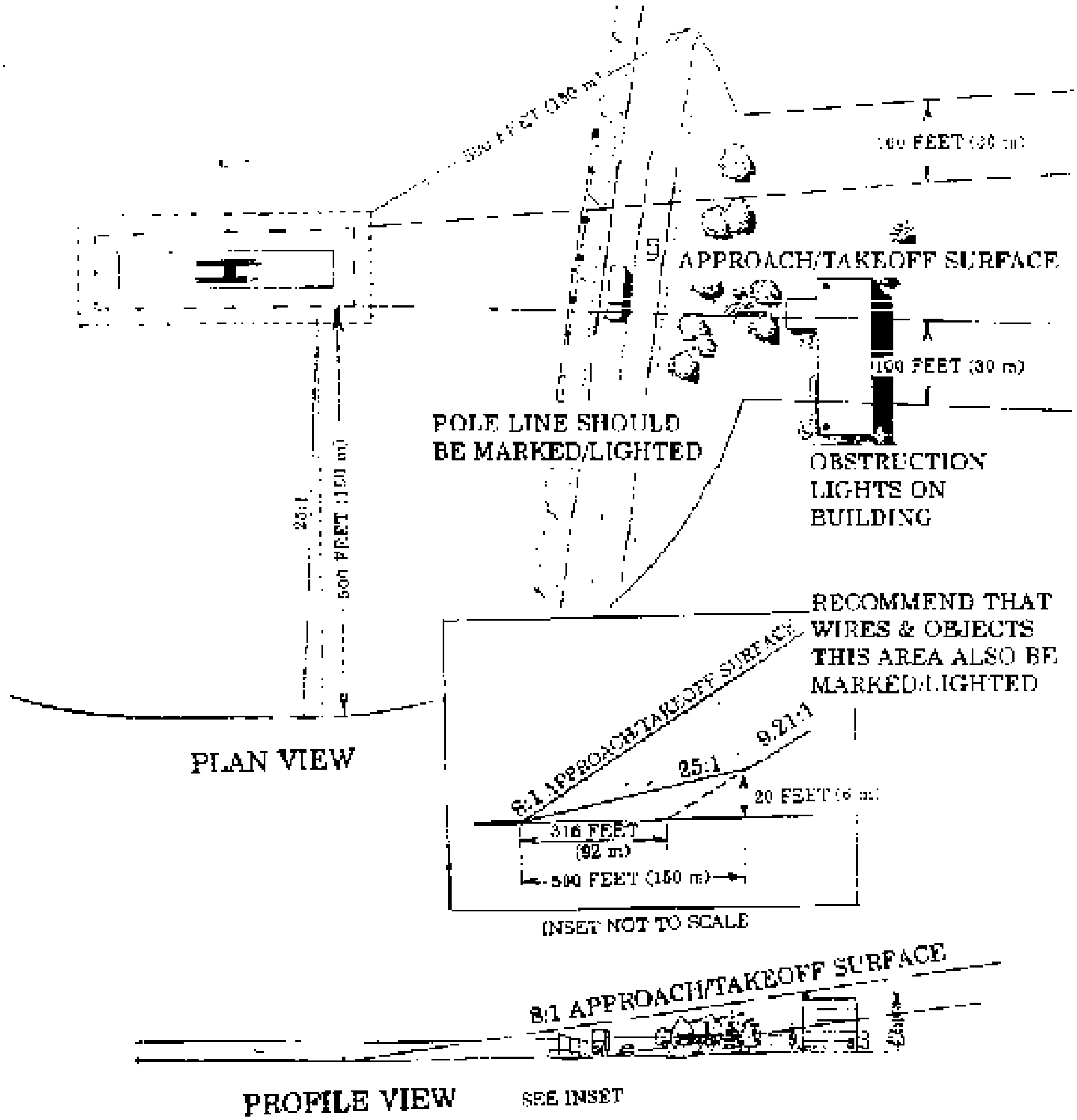



Figure 4-13. Recommended area for wire marking and/or lighting

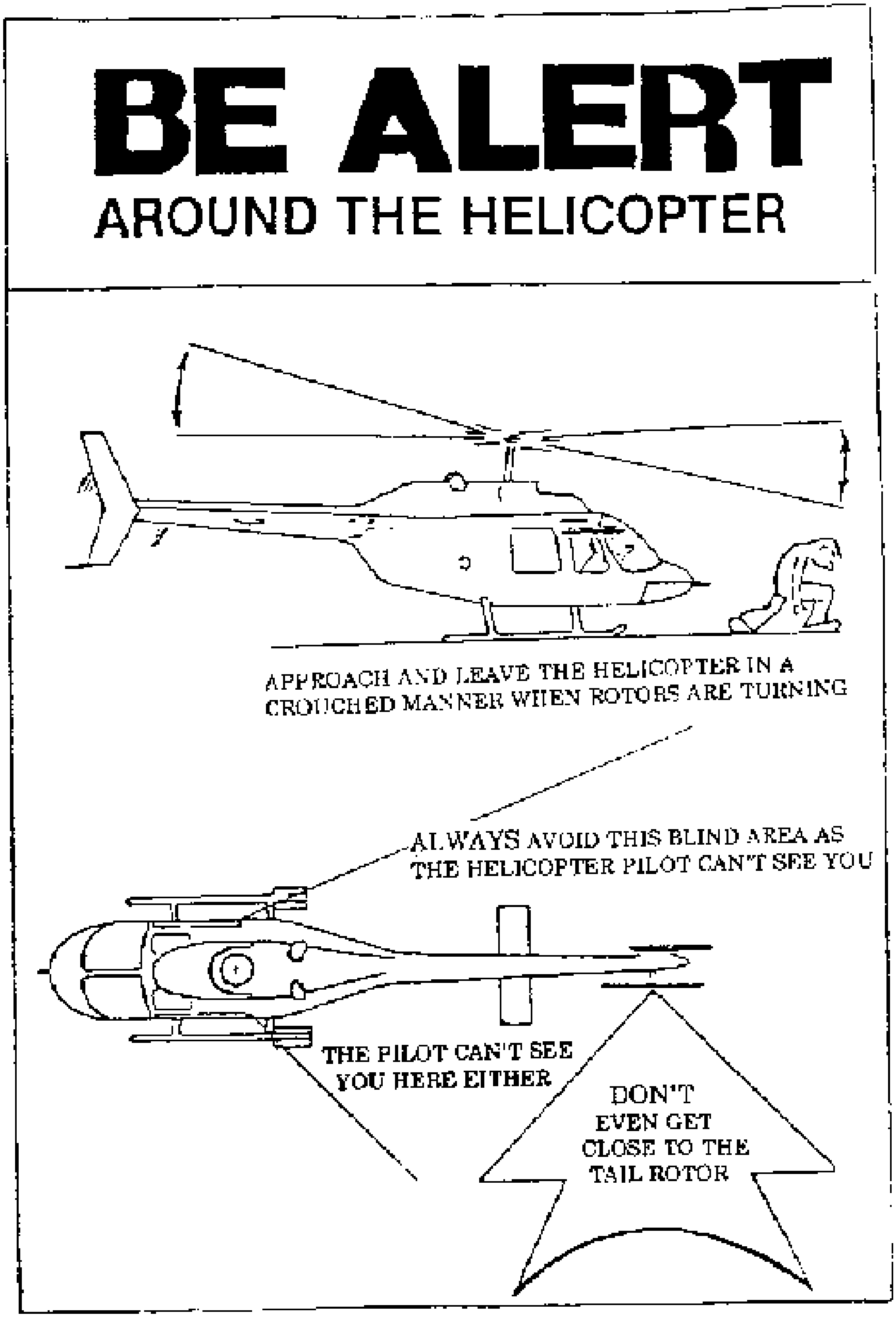



Figure 4-14. Caution sign

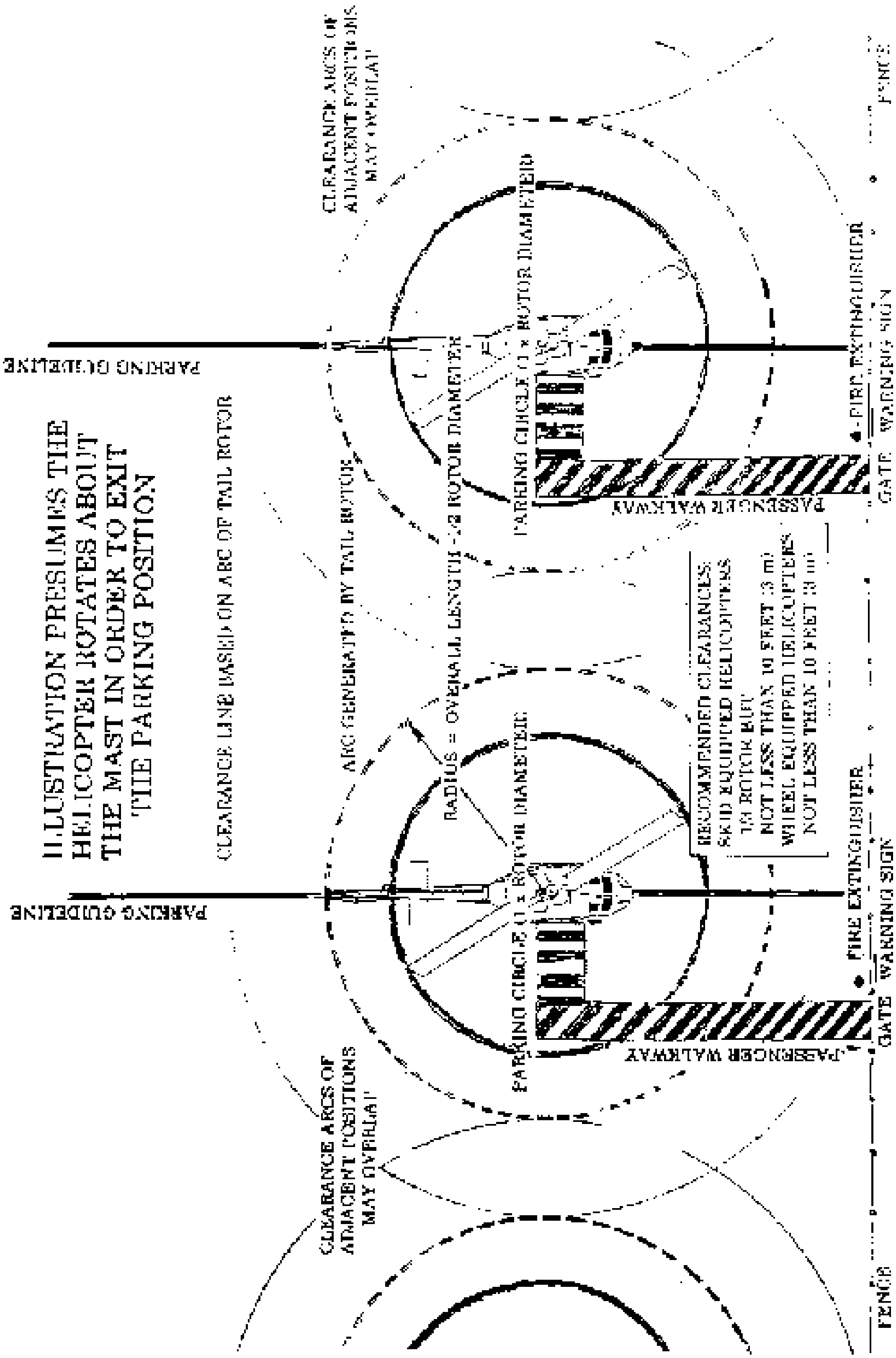



Figure 4-15. Apron parking position clearances

# CHAPTER 5. HOSPITAL HELIPORTS

**53. GENERAL.** Helicopters have proven to be an effective means of transporting injured persons from the scene of an accident to a hospital, and in transferring patients in critical need of specialized services to another hospital having that capability. A fully functional hospital heliport may be as simple as a cleared area on the lawn together with a wind indicator (wind sock) and a clear approach/takeoff path. To the extent feasible, the approach/takeoff path should be aligned with the dominate winds. This chapter contains recommendations for hospitals to use in designing a heliport to accommodate air ambulance operations and emergency medical service personnel and equipment. Figure 5-1 illustrates the essential features of a hospital heliport.

**54. FINAL APPROACH AND TAKEOFF AREA (FATO).** A hospital heliport must have at least one FATO.

**a. Location.** The FATO may be at ground or roof top level. Objects or structures should be outside of the FATO to permit at least one clear approach/ takeoff path aligned with the prevailing winds. To avoid or minimize the need for additional ground transport, the FATO should be located to have ready access to the hospital's emergency room. Portions of the FATO of rooftop heliports may extend into the clear airspace beyond the buildings edge.

**b. Size.** The recommended minimum dimension of a hospital FATO is 1.5 times the overall length of the design helicopter.

**c. Gradients.** Gradients may range from 0.5 percent to 2.0 percent for any area on which the helicopter is expected to land. Drainage should be directed away from hospital buildings and areas occupied by people.

**55. SAFETY AREA.** A safety area having a width equal to 1/3 the rotor diameter of the design helicopter, but not less than 10 feet (3 m), surrounds the FATO. The FATO and the safety area should be free and clear of objects such as light poles, buildings, trees, and parked autos which could be struck by the helicopter's main or tail rotor, or catch the skids, of an arriving or departing helicopter.

**56. TOUCHDOWN AND LIFT-OFF AREA (TLOF).** A paved TLOF is not required. When a paved or other hard surfaced TLOF is provided, it is normally centered in the FATO. Irregularly shaped or oversized FATOs should have the center of the TLOF located at least 3/4 of the design helicopter's overall length in from the FATO boundaries. Hard surface TLOFs are recommended to provide an all-weather wearing surface for the helicopter and a firm working surface for hospital personnel and the wheeled equipment used in moving patients.

**a. Size.** The recommended minimum dimension of the TLOF is 40 feet (12 m).

**b. Surface Characteristics.** Paved TLOF surfaces should have a roughened finish that will provide a skid resistant surface for helicopters and non-slippery footing for hospital personnel. The TLOF should be constructed to support the 1.5 times the weight of the design helicopter.

**c. Gradients.** The recommended gradients for a TLOF range from a minimum of 0.5 percent to a maximum of 2.0 percent.

**57. ROOF TOP HELIPORTS.** Roof top heliport TLOFs may be constructed of wood, metal, or concrete. Elevator penthouses, cooling towers, exhaust/fresh air vents, and other raised features impact roof top helicopter operations. To the extent practical, the TLOF of a roof top heliport should be elevated above the level of any obstacle in the FATO. Other objects or structures should be outside the FATO to permit at least one clear approach/takeoff path aligned with the prevailing winds. Figure 5-2 illustrates this recommendation. Elevated platforms should be designed to support 1.5 times the maximum takeoff weight of the design helicopter. When the TLOF is on a platform elevated more than 30 inches (75 cm) above its surroundings, a 5 foot (1.5 m) wide safety net or shelf should be provided. The safety net or shelf should have a load carrying capability of 25 pounds per square foot (122 Kg per sq. m). The net or shelf, as illustrated in figure 5-3, should not project more than 2 inches (5 m) above the level of the TLOF. A report, Structural Design Guidelines for Heliports, (Report Number AD-A148967) is available from the National Technical Information Service, Springfield, VA 22161.

**58. APPROACH/TAKEOFF SURFACE.**

**a. Approach/Takeoff Path.** A hospital heliport must have a at least one approach/takeoff path. This path, to the extent practical, should be aligned with the dominate winds. Two approach/takeoff paths, oriented to be 90 to 180 degrees apart, will minimize the times when the helicopter would have to land or takeoff with a crosswind or tailwind. Approach/takeoff paths may curve to avoid objects and/or noise sensitive areas and utilize the airspace above public lands e.g. freeways, rivers, etc.

**b. Approach/Takeoff Surface.** An approach/takeoff surface is centered on each approach/takeoff path and should conform to the dimensions of the FAR Part 77 heliport approach surface. Figure 1-6 illustrates the heliport approach surface which should be free of object penetrations.

**c. Approach Protection.** It is recommended that as much of the approach/takeoff surface as circumstances permit overlay hospital property.

**59. HELICOPTER PARKING.** A separate helicopter parking area is required at heliports that will accommodate more than one helicopter at a time. Helicopter parking areas should not lie under an approach/takeoff surface.

**60. HELIPORT MARKERS AND MARKINGS.** Markers and/or surface markings are recommended to define the perimeters of the FATO and TLOF surfaces and to identify the facility as a hospital heliport. Surface markings may be paint or preformed material.

**a. Perimeter Markings.** The perimeter of the FATO and/or the TLOF should be defined with in-ground markers and/or surface markings. When the TLOF edges are obvious, such as a paved TLOF in a turf FATO, perimeter markings may not be required.

**(1) Unpaved Surfaces.** The perimeter of an turf FATO should be identified with in-ground markers that will not catch helicopter skids or create barriers to helicopter maneuvering. If raised markers are used, they should be located at the outer edges of the safety area and be no more than 8 inches (20 cm) in height. Markers are placed at the corners and as needed along the edges of the FATO. Figure 5-4 illustrates different types of in-ground and raised markers.

**(2) Paved Surfaces.** A 12 inch (30 cm) wide dashed white line defines the FATO perimeter. The segments and separation between segments should be even. The corners must be defined and the edge segments should be approximately 5 feet (1.5 m) in length. A 12 inch (30 cm) wide white line defines the perimeter of a TLOF. These lines are illustrated in figure 5-4.

**b. Identification Marking.** A hospital heliport is identified by a red capital letter H centered on a white cross. The recommended maximum dimensions of the cross is 30 feet (9 m) by 30 feet (9 m) as illustrated in figure 5-4 and more fully described in appendix 2. The red H is centered in the cross with the H oriented to align with the preferred direction of approach. To enhance the cross symbol conspicuity in areas subject to snow, the pavement between the cross and the white TLOF perimeter line may be solid red.

**c. Closed Heliport.** All markings of a permanently closed hospital heliport should be obliterated. If obliteration is impractical, a yellow X, as illustrated in figure 5-5, should be placed over the existing markings. The X must be large enough to ensure early pilot recognition.

**61. HELIPORT LIGHTING.** Because ambient lighting is usually inadequate, the landing area and the wind indicator (sock) should be lighted for night operations.

**a. Perimeter Lights.** At least 3 uniformly spaced lights are recommended per side of a square or rectangular FATO or TLOF with a light located at each corner. A minimum of eight lights are needed to define a circular FATO or TLOF. The interval between lights should not exceed 25 feet (7.5 m).

**(1) FATOs.** Flush lights may be located on, or within 1 foot (30 cm) of, the FATO edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, should be located 10 feet (3 m) out from the edge of the FATO.

**(2) TLOFs.** Flush lights may be located on, or within 1 foot (30 cm) of, the TLOF edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, may be located 10 feet (3 m) out from the TLOF edge and should not penetrate a horizontal plane at the TLOF's elevation by more than 2 inches (5 cm). Figure 5-6 illustrates hospital heliport lighting.

**(3) Raised TLOFs.** Flush lights may be placed within 1 foot (30 cm) of the edge of a raised TLOF. Raised fixtures are illustrated in figure 5-7. In snow areas, it is suggested that the lights be placed along the outer edge of the safety net or shelf.

**b. Floodlights.** Floodlights may be used to illuminate the heliport. To eliminate the need for tall poles, these floodlights may be mounted on an adjacent building. Care should be taken, however, to place floodlights clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces. Floodlights should be aimed down and provide a minimum of 3 foot candles (32 lux) of illumination over the heliport surface. Floodlights which might interfere with pilot vision during takeoff and landings must be capable of being turned off during landings and takeoffs.

**c. Heliport Beacon.** A beacon may not be necessary when the location of the hospital can be readily determined by the lighting on a prominent building or landmark near the heliport. When a beacon is provided, it should be located on the highest point on the roof of the hospital. Beacons should conform to AC 150/5345-12, Specification for Airport and Heliport Beacon.

**d. Wire Marking.** Where practical, it is recommended that unshielded electric and telephone wires located within 500 feet (150 m) of the FATO, as well as those within 1/2 mile (1 km) that are beneath and up to 100 feet (30 m) to the side of an approach/takeoff path be marked to make them more conspicuous. Figure 5-8, illustrates the area that should be considered for marking and/or lighting. Guidance on marking and lighting objects is contained in AC 70/7460-1, Obstruction Marking and Lighting.

**62. WIND DIRECTION INDICATOR.** A hospital heliport must have at least one wind indicator. A wind sock is the preferred indicator as it shows both the direction and magnitude of the wind. The wind sock should be placed where it provides a true indication of surface wind and clear of the safety area and the approach/takeoff surface(s). The wind sock may be internally or externally lighted for night operations, or, alternatively be located in an illuminated area.

**63. MAGNETIC RESONANCE IMAGERS (MRI).** Hospital equipment, such as an MRI used in diagnostic work, can create a strong magnetic field which will cause temporary aberrations in the helicopter's magnetic compass and may interfere with other navigational systems. Heliport proponents should be alert to the location of any Magnetic Resonance Imagers (MRI) with respect to the heliports location. A warning sign alerting pilots to the presence of an MRI is recommended. Verbal warning that the MRI is operating should be given in radio contacts with an approaching EMS helicopter.

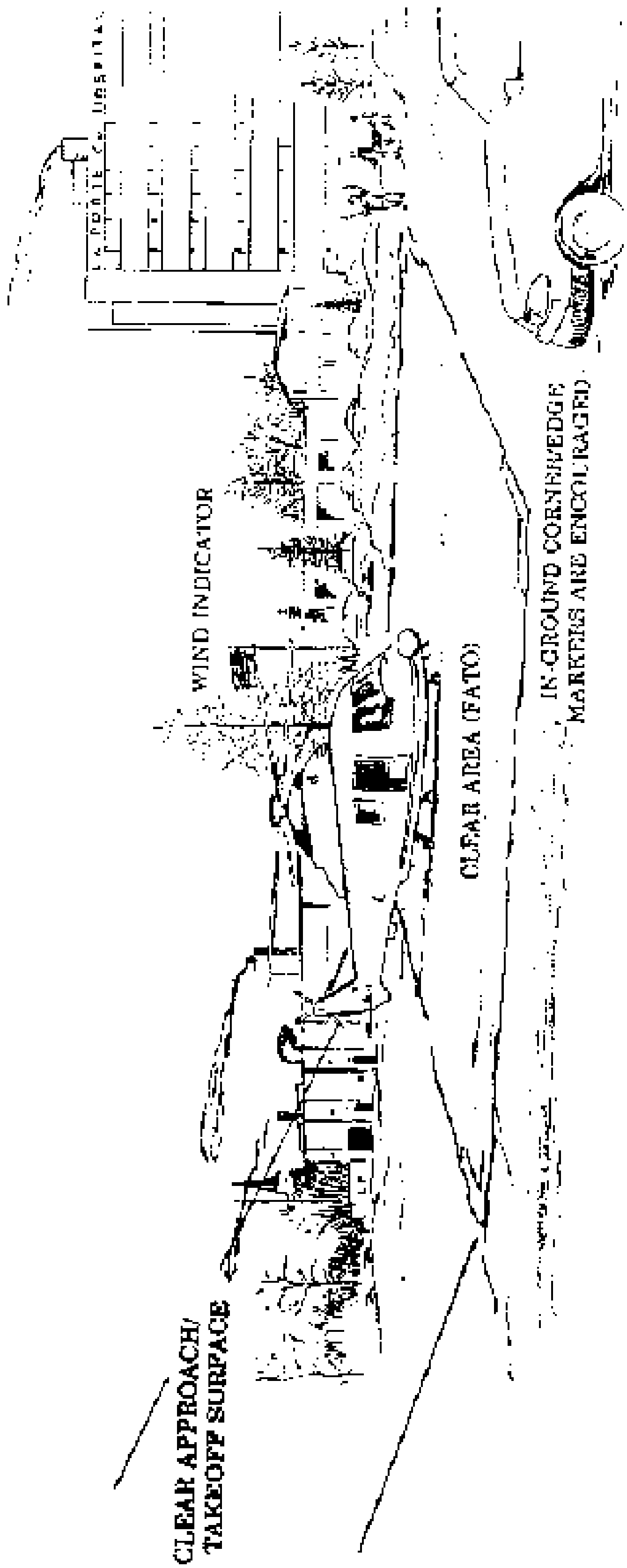



**Figure 5-1. A basic hospital heliport**

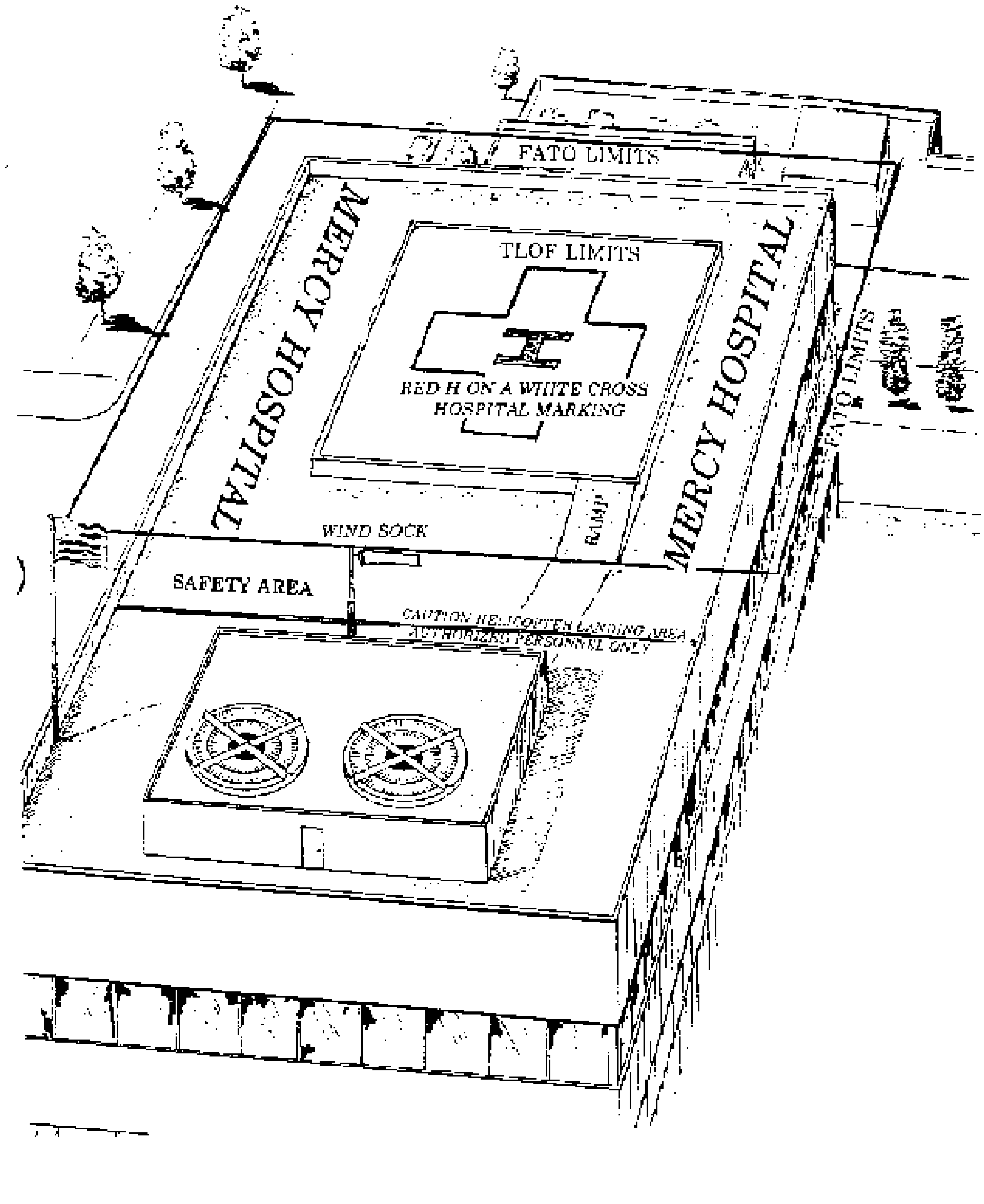



Figure 5-2. A roof top hospital heliport

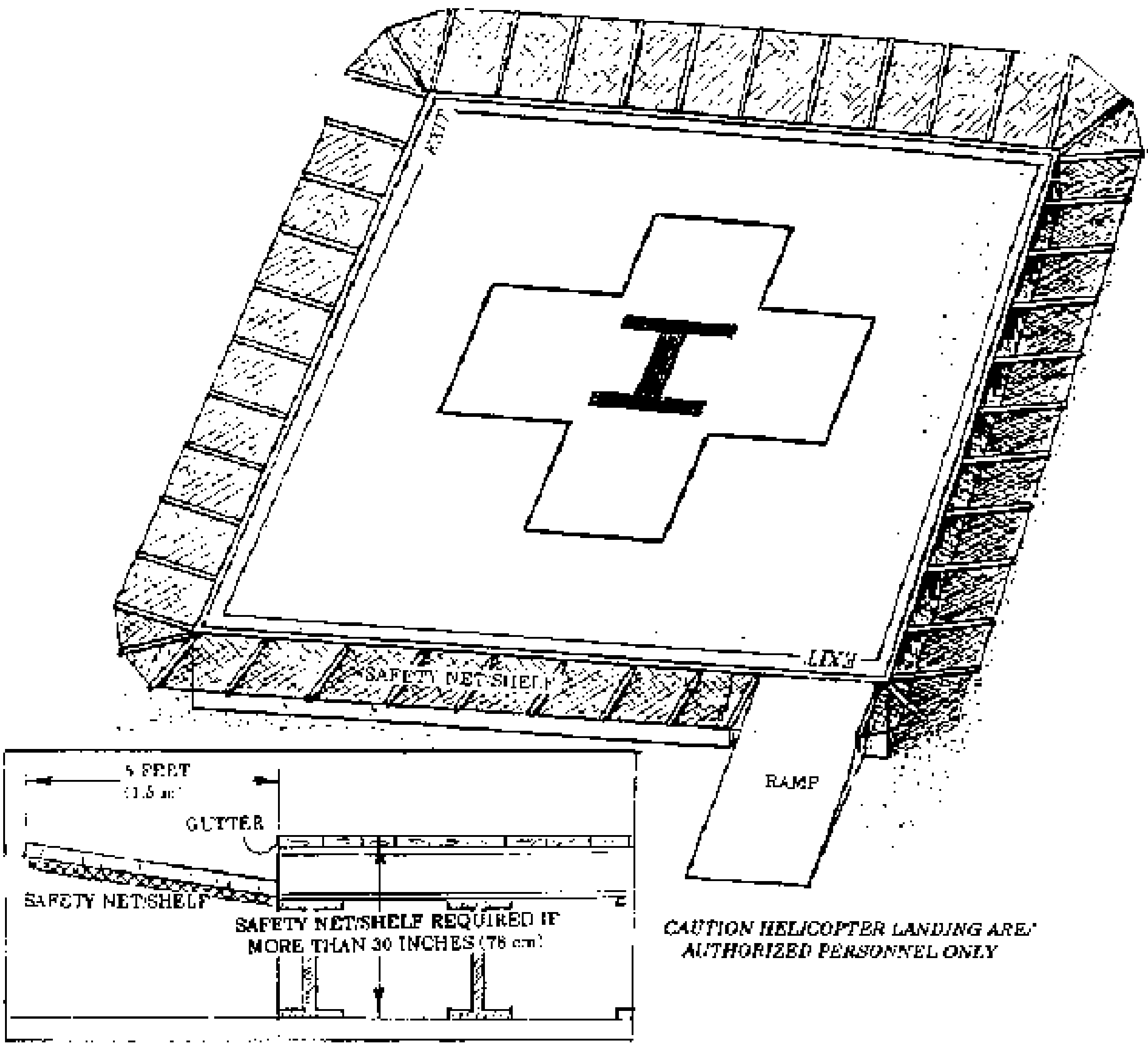



Figure 5-3. Elevated TLOF and safety net

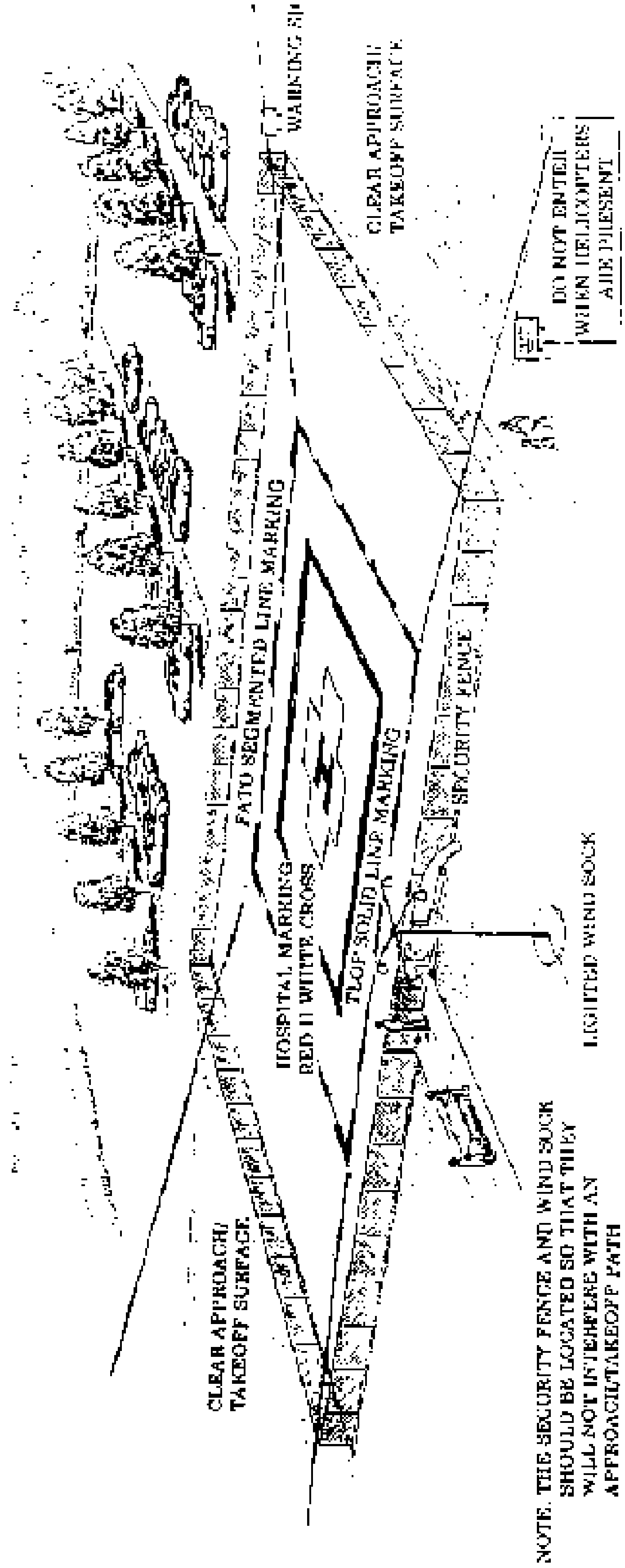



**Figure 5-4. Hospital heliport markings**

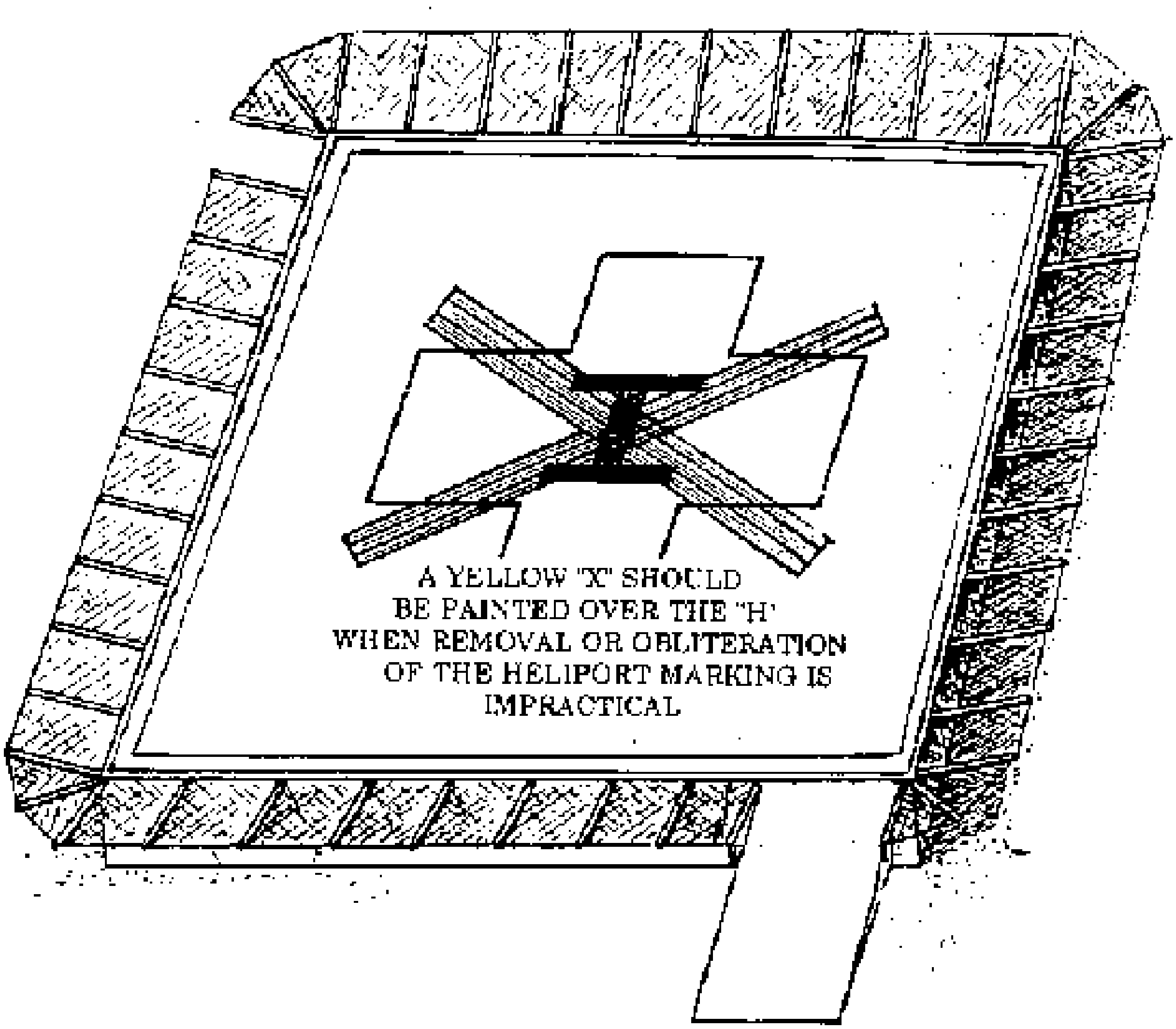



Figure 5-5. A closed hospital heliport

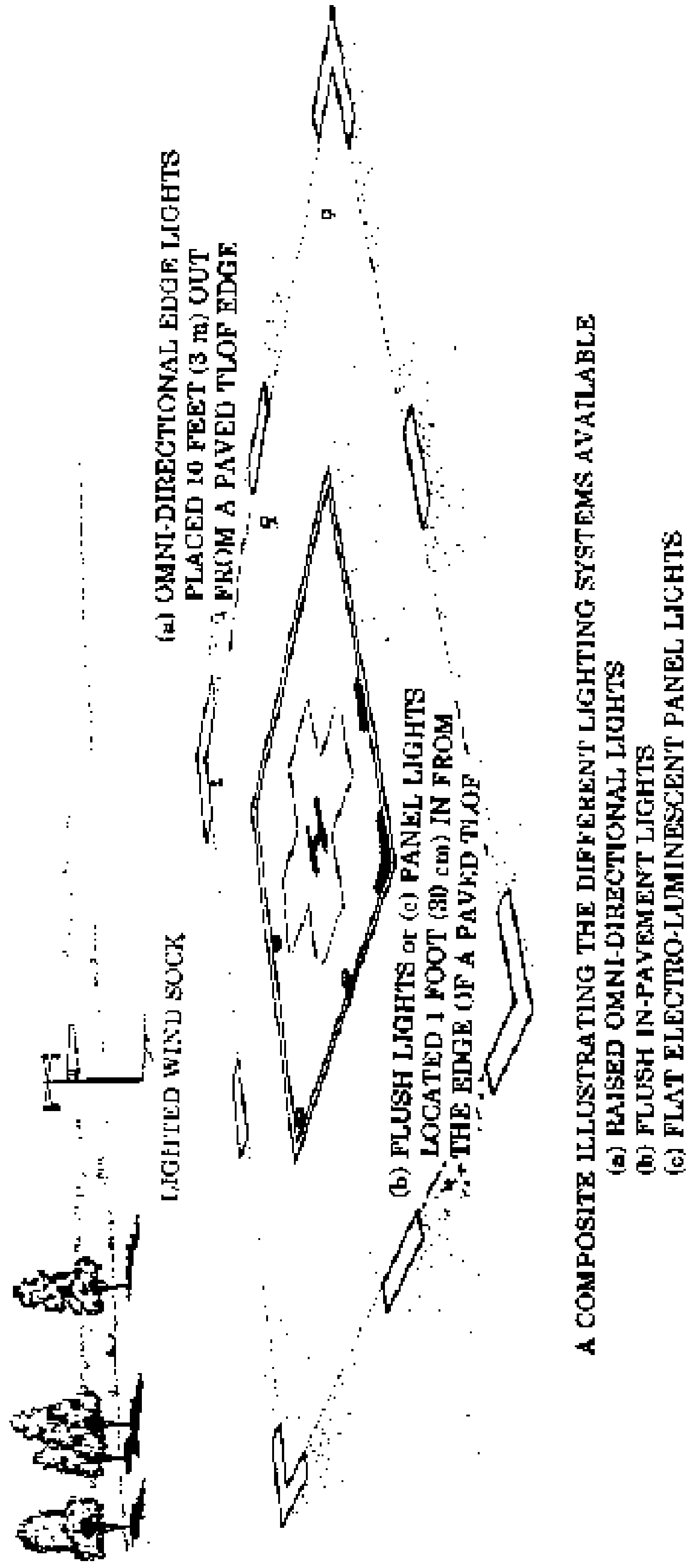



Figure 5-6. Hospital heliport lighting

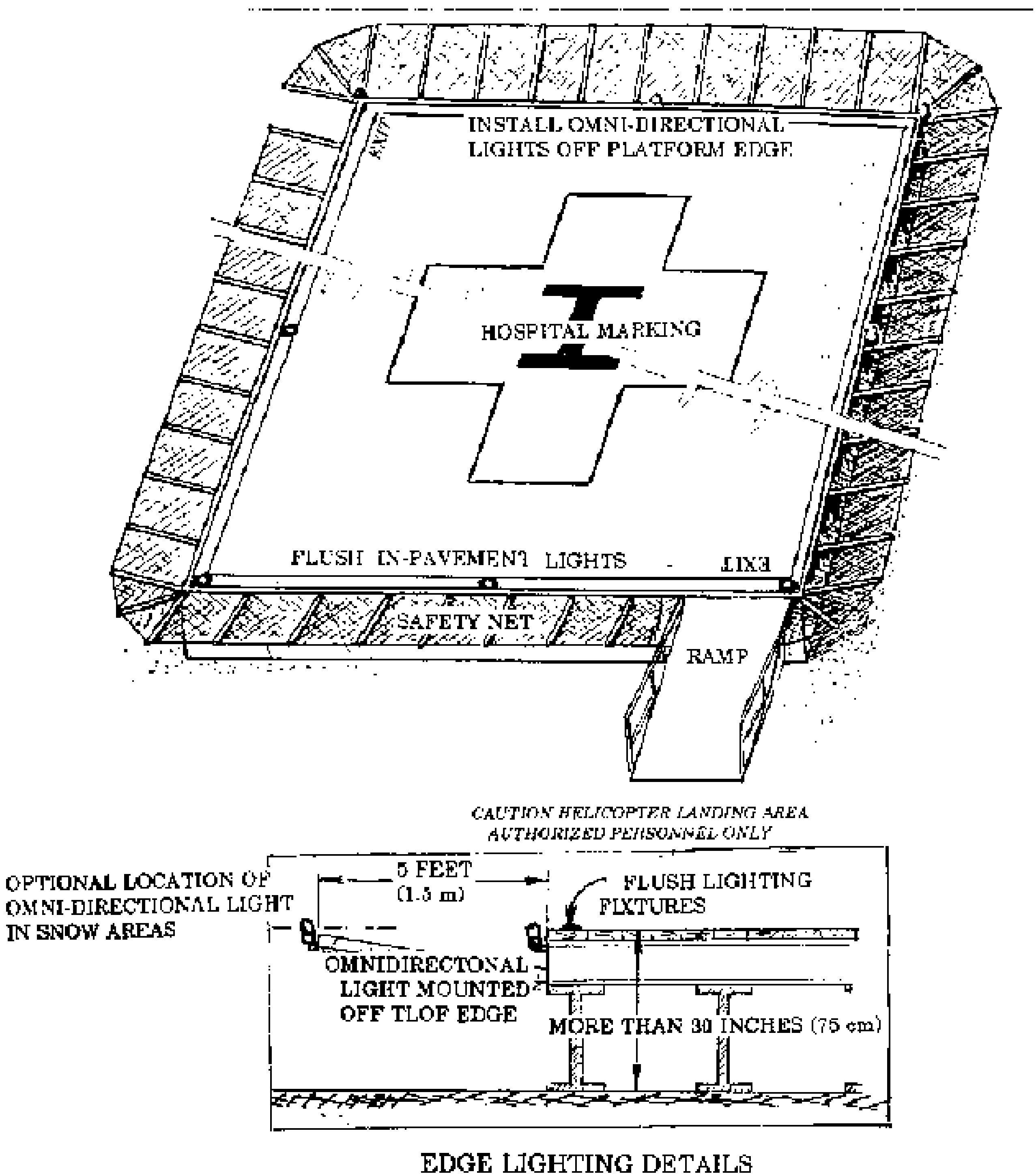



Figure 5-7. Raised platform lighting

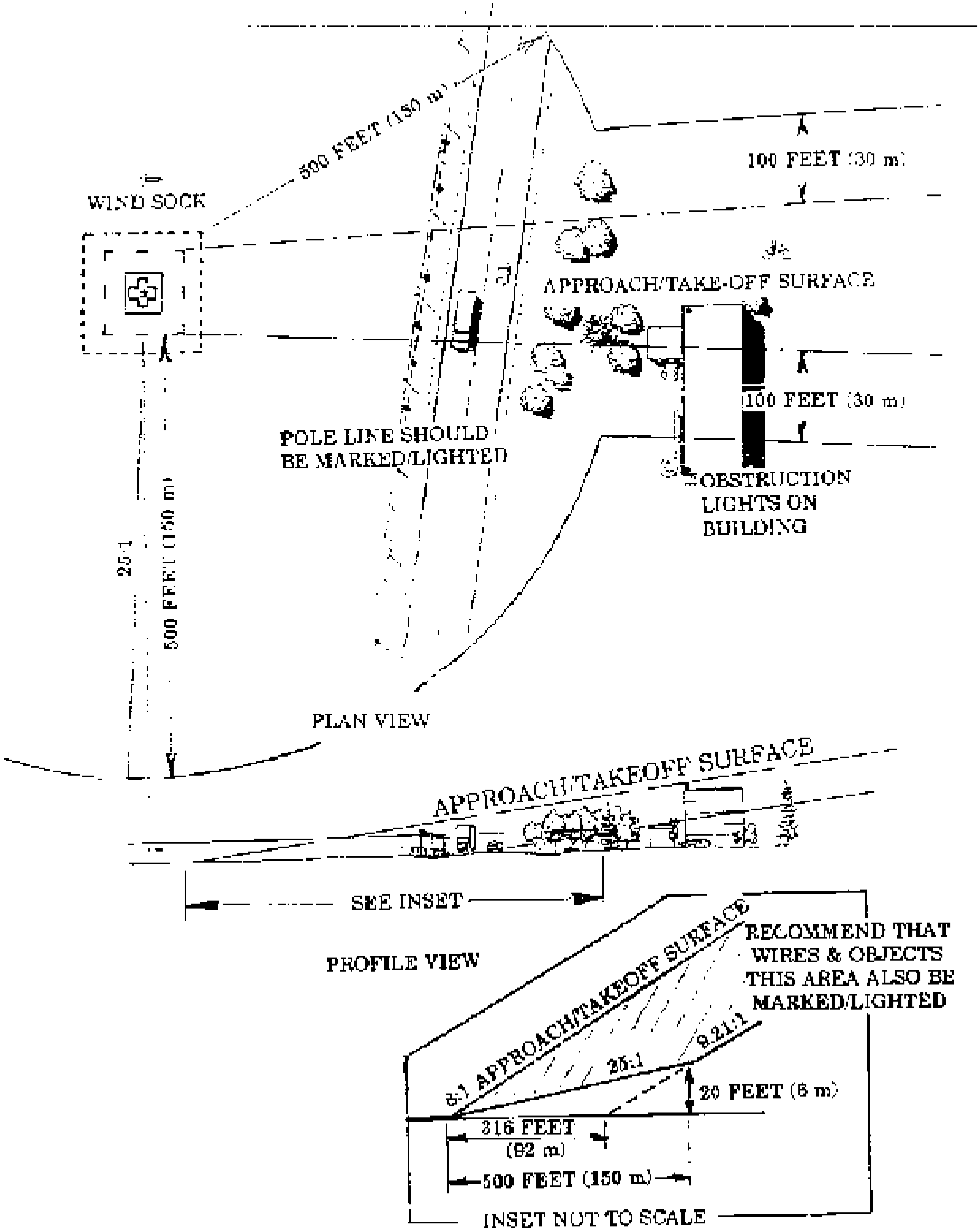



Figure 5-8. Recommended area for wire marking and/or lighting

# CHAPTER 6. HELICOPTER FACILITIES ON AIRPORTS

**64. GENERAL.** Helicopters are able to operate on most airports without unduly interfering with airplane traffic. Separate facilities and approach/takeoff procedures may be necessary when the volume of airplane and/or helicopter traffic impacts operations. At airports with inter-connecting passenger traffic, the terminal apron should provide gates for helicopter boardings. Persons who use a helicopter to go to an airport generally require convenient access to the airport terminal and services provided airplane passengers. The airport layout plan (ALP) should be amended or revised to identify the location of the exclusive use helicopter facilities, approach/takeoff paths, and helicopter taxi routes. This chapter addresses design considerations for providing separate helicopter facilities on airports.

**65. TAKEOFF AND LANDING SURFACES.** The area(s) developed/designated for helicopter landings and takeoffs may be located anywhere on the airport. The takeoff/landing area should provide for ready access to the airport terminal or to the helicopter users origin or destination.

**a. FATOs/TLOFs.** FATO/TLOF dimensions and clearances in chapters 3 and 4 also apply to facilities being developed on an airport for helicopter usage.

**b. Approach/Takeoff Paths.** Each FATO/TLOF must have at least one approach/takeoff path meeting the criteria in chapters 3 and 4. To the extent practical, helicopter approach/takeoff paths should be independent of approaches to active runways.

**c. Spacing Criteria**. The recommended distance between the centerline of an approach to a runway and the centerline of an approach to a FATO for simultaneous same direction VFR operations is provided in table 6-1.

**d. Marking and Lighting.** The marking and lighting systems of chapters 3 and 4 also apply to airport helicopter facilities. When the FATO or TLOF is located on an existing paved area, such as an apron or taxiway traversed by airplanes, all markings and lighting fixtures defining the FATO and TLOF, and taxi route centerlines or limits should be flush with the pavement as illustrated in figure 6-1.

**66. SURFACE MOVEMENT.** Helicopter taxiways and taxi lanes should conform to the criteria of chapter 3 or 4. Paved taxiways permit wheel equipped helicopters to ground maneuver. When taxi distances are great, both wheel and skid equipped helicopters can be expected to hover or air taxi.

**a. Hover Taxiing.** The cylindrical markers illustrated in figure 6-2 are recommended to define the edges of a route for helicopters hover taxiing. Hover taxi routes should meet the appropriate clearance requirements and be located to minimize interaction with airplane operations. The cylindrical markers displaying 3 equal width bands of yellow-blue-yellow define hover taxi route edges. Markers are placed at intervals not in excess of 100 feet (30 m) on straight sections and 50 feet (15 m) on curved sections.

**b. Air Taxiing.** Air taxiing at elevations approximately 100 feet (30 m) above the surface is preferred when helicopters must traverse long distances. The large markers illustrated in figure 6-2 may be used to define the centerline when air taxiing 100 feet (30 m) above ground level and should avoid or minimize interaction with airplane operations. Markers are placed at intervals not in excess of 200 feet (60 m) on straight sections and 100 feet (30 m) on curved sections.

Table 6-1. Distance between FATO center to runway centerline

| | Small Helicopter<br>6,000 lbs or less | Medium Helicopter<br>12,000 lbs or less | Heavy Helicopter<br>over 12,000 lbs |
|---|---|---|---|
| Small Airplane<br>12,500 lbs or less | 300 feet<br>90 m | 500 feet<br>150 m | 700 feet<br>210 m |
| Large Airplane<br>12,000 lbs to 300,000 lbs | 500 feet<br>150 m | 500 feet<br>150 m | 700 feet<br>210 m |
| Heavy Airplane<br>Over 300,000 lbs | 700 feet<br>210 m | 700 feet<br>210 m | 700 feet<br>210 m |

**c. Parking Positions.** Helicopter parking positions should be located as close to the intended destination or origination of the passengers as conditions permit. Clearances should conform with the apron design and marking criteria of chapters 3 or 4. Locate parking positions to minimize helicopter rotor wash from upsetting parked airplanes.

**d. Passenger Walkways.** Passenger movement in operational areas should be restricted to marked walkways. Figure 4-15 illustrates one marking scheme. Apron pavements should be designed so that spilled fuel does not drain onto passenger walkways or toward parked helicopters.

**67. PASSENGER SERVICES.** Unless screening was carried out at the helicopter passengers departure location, Federal Aviation Regulations require that a screening area and/or screening be provided before passengers enter the airport's secured areas. Multiple helicopter parking positions and/or locations may be needed in the terminal area to service helicopter passenger and/or cargo inter-line connecting needs.

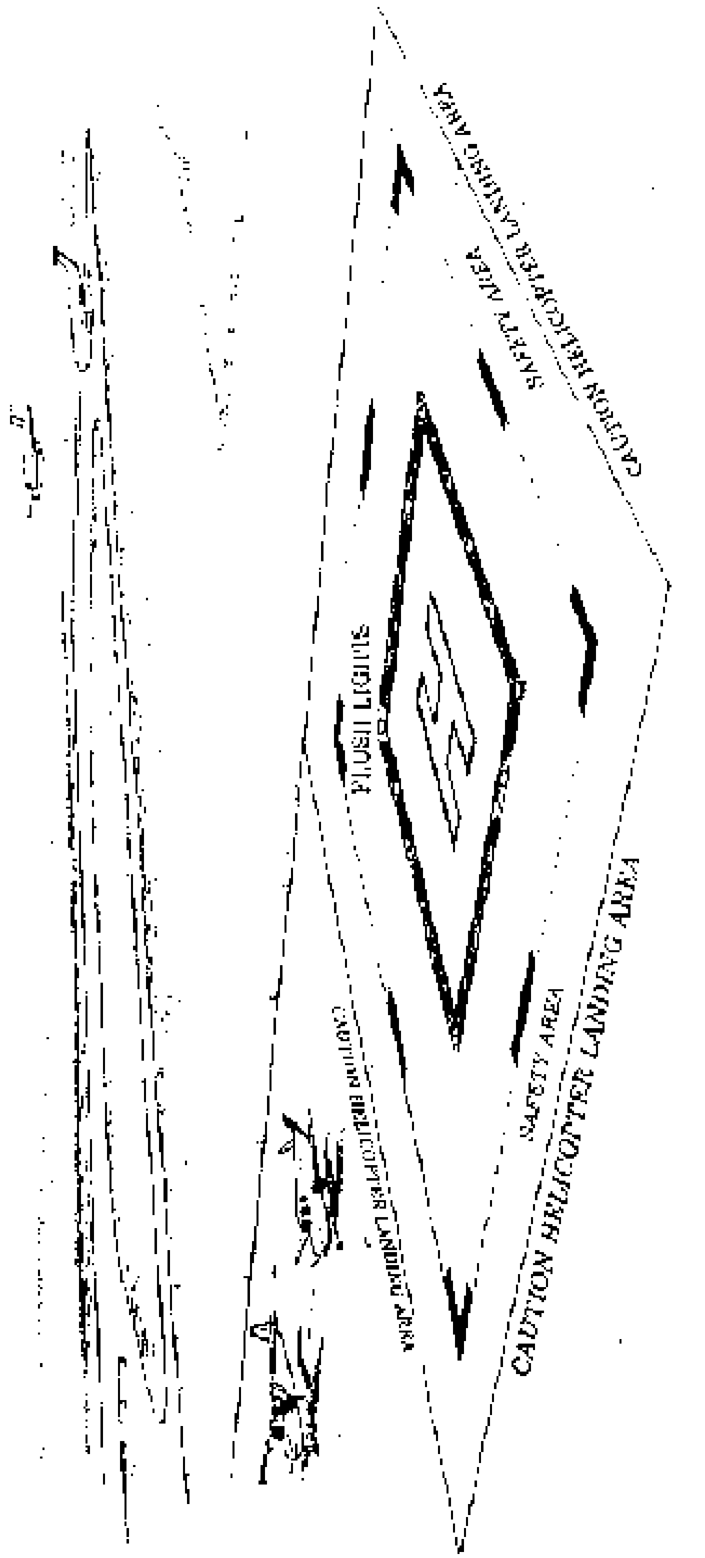



Figure 6-1. Apron TOLF

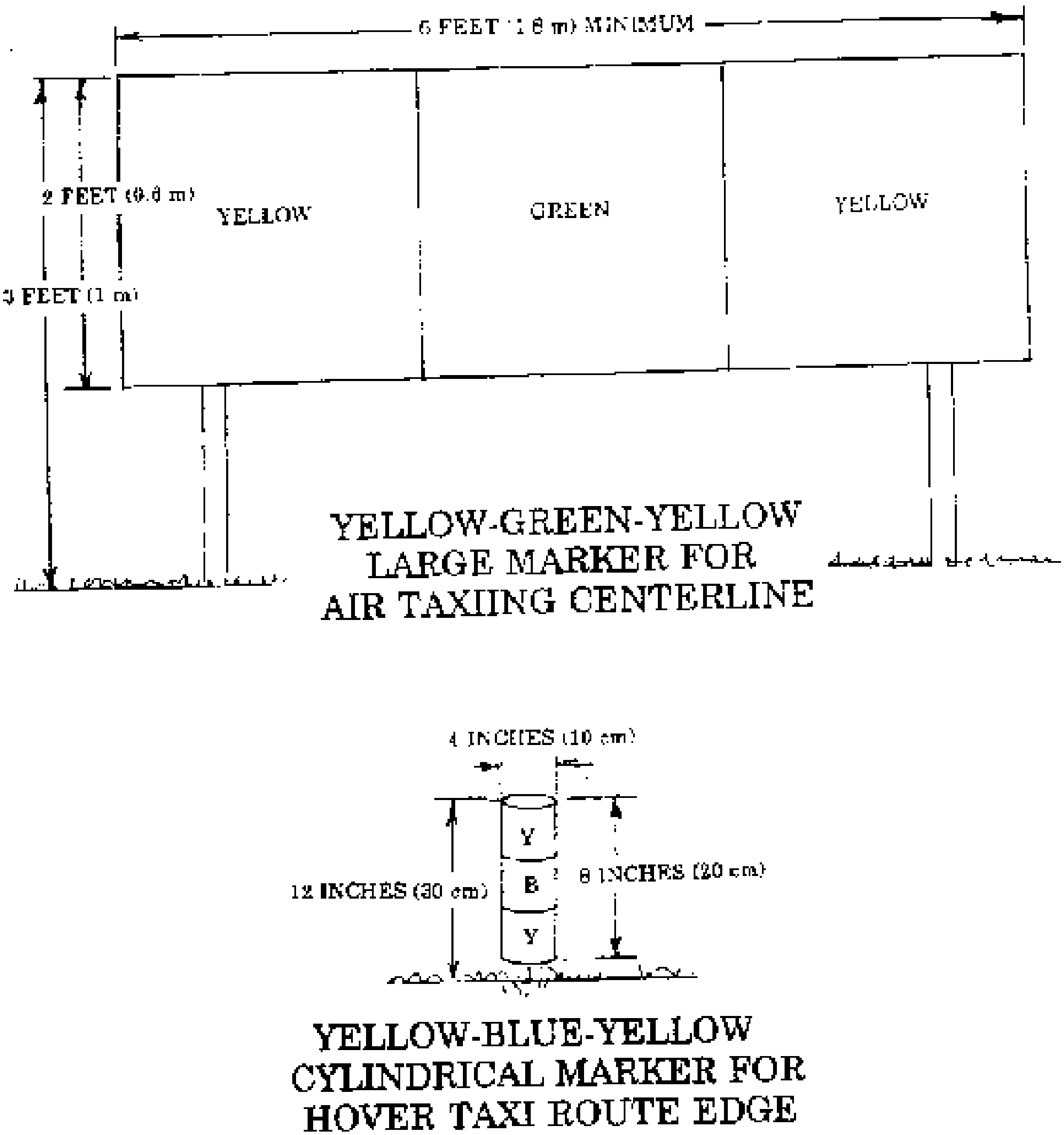



Figure 6-2. Large and cylindrical markers for helicopter air taxiing and hover taxiing at airports

# CHAPTER 7. NON-PRECISION INSTRUMENT OPERATIONS

**68. GENERAL.** A non-precision approach procedure permits helicopter operations to continue during periods of reduced visibility. The procedure is based on signals providing bearing and distance information. The signals are broadcast from navigational aids such as a Very High Frequency Omni-range (VOR) transmitter located at some distance from the heliport. The non-precision procedure is established in accordance with Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS). To achieve lower minimums, the following criteria for the improved lighting system and increased airspace is recommended. This chapter addresses issues which heliport owners should consider before requesting the development of a non-precision approach procedure.

**69. IMPROVED LIGHTING SYSTEM.** The enhanced perimeter lighting system and the Heliport Instrument Lighting System (HILS), illustrated in figure 7-1, are recommended.

**a. Perimeter Light Enhancement.** An additional light is inserted between each light in the front and rear row of perimeter lights to enhance the definition of the TLOF.

**b. HILS Lights.** Three unidirectional PAR 56, 200 watt aimed lights (edge bars) extending the right and left line of perimeter lights fore and aft and the front and rear line of perimeter lights right and left.

**(1) Edge Bars.** Edge bar lights are spaced at 50 foot (12.5 m) intervals, measured from the front and rear row of perimeter lights.

**(2) Wing Bars**. Wing bar lights are spaced at 15 foot (4.5 m) intervals, measured from the line of perimeter edge (side) lights.

**c. Optional Lights.** An optional feature is a line of 7 white flush lights spaced at 5 foot (1.5 m) intervals installed in the TLOF pavement. The lights are aligned on the centerline of the approach course to provide close in directional guidance and improve TLOF surface definition.

**70. OBSTACLE EVALUATION SURFACES.** The following surfaces are evaluated for object penetrations when the improved lighting system is provided for lower minimums. Figure 7-2 illustrates these surfaces.

**a. Approach Surface.** The approach surface is a trapezoidally shaped plane starting at the end and elevation of the FATO. The surface is wider than the recommended FATO. It begins at a width of 500 feet (150 m) and flares outward to a width of 5,000 feet (1 500 m) in a horizontal distance of 10,000 feet (3 000 m). The surface slopes upward at a ratio of 20:1 (horizontal to vertical).

**b. Transitional Surfaces.** Transitional surfaces extend outward and upward from the edges of the FATO and the non-precision approach. Transitional surfaces slope upward at a ratio of 4:1 (horizontal to vertical).

**(1)** FATO transitional surfaces terminate in a horizontal distance of 350 feet (105 m) measured from the edges of the FATO.

**(2)** Approach/takeoff transitional surfaces terminate in a horizontal distance of 600 feet (180 m) measured from the centerline of the approach/takeoff surface.

**c. Missed Approach Surfaces.** All instrument procedures require a missed approach procedure. The surfaces for a missed approach procedure may continue in the direction of the approach or incorporate a turn. Missed approach surfaces are complex and need to be discussed with an FAA airspace procedures specialist early in the effort.

**NOTE:** *Non-precision instrument approach procedures utilizing Loran C and/or Global Positioning System (GPS) signals are being evaluated. The imaginary surfaces to be evaluated for penetrating objects may differ from the imaginary surfaces described herein.*

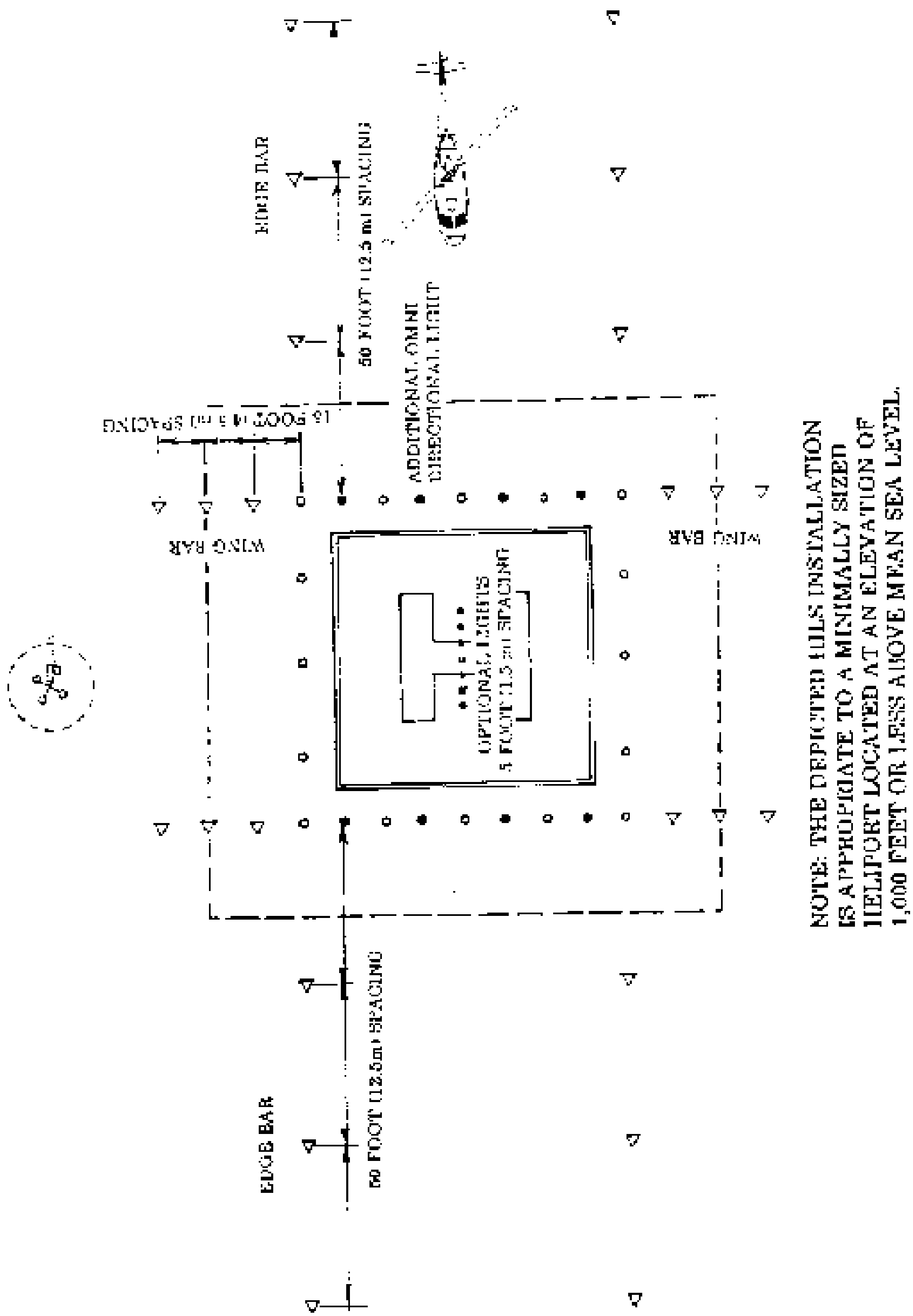



Figure 7-1. Heliport instrument lighting system (HILS)

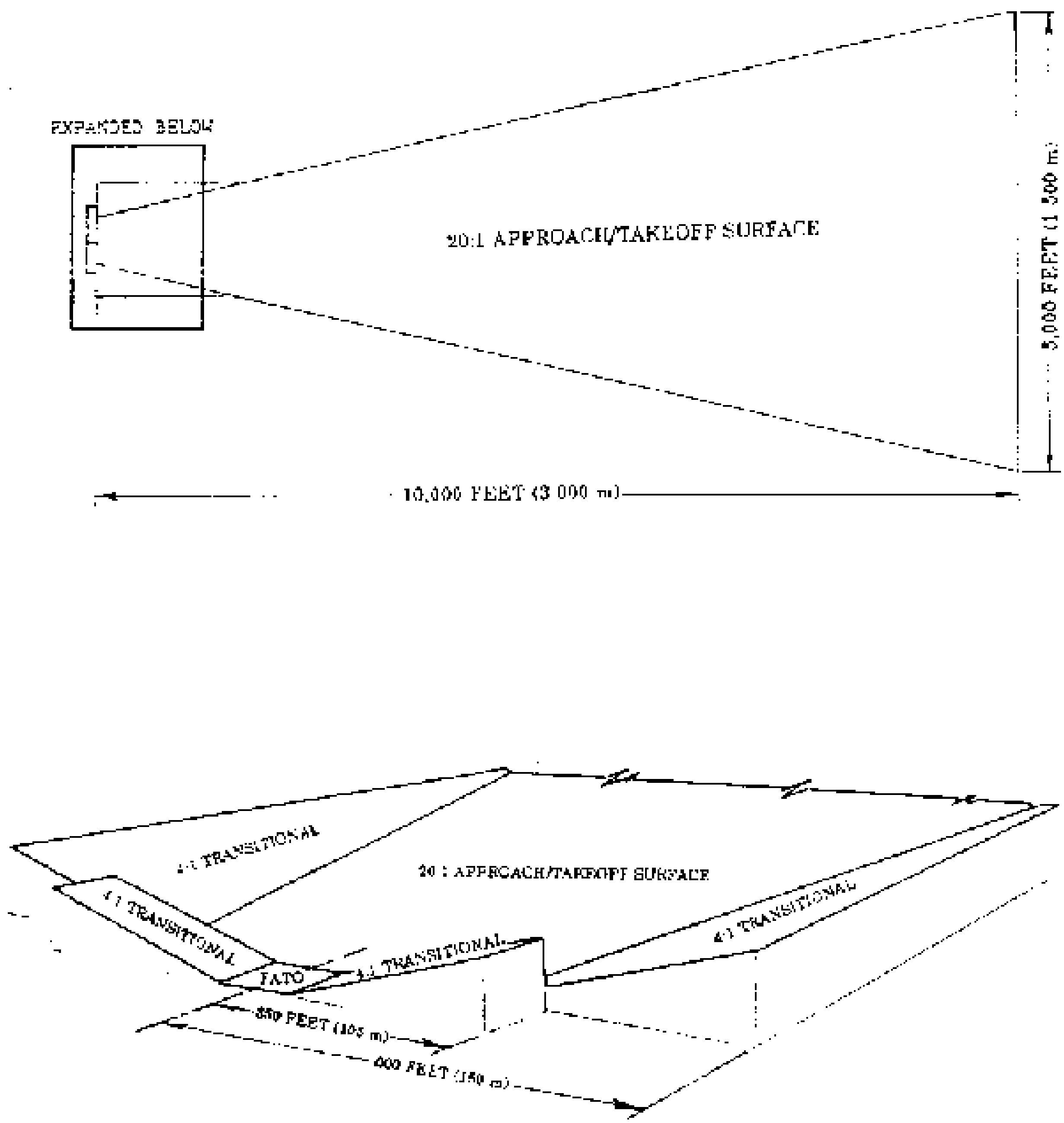



Figure 7-2. Obstacle evaluation surfaces

# CHAPTER 8. PRECISION APPROACH OPERATIONS

**71. GENERAL.** A precision instrument approach procedure is necessary to provide the operational capability desired by many executive and corporate users. Such a procedure is established in accordance with Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS), and is essential to assure the all-weather reliability needed for a helicopter air carrier to be successful in offering scheduled service. This chapter describes the larger ground area (FATO) associated with precision instrument operations and describes the imaginary aerial surfaces which are evaluated for the impact of object penetrations. Heliport owners desiring a precision instrument approach procedure are urged to initiate early contact with the appropriate FAA Regional Office.

**72. FINAL APPROACH REFERENCE AREA (FARA).** A certified helicopter precision approach procedure terminates in the helicopter coming to a hover or touching down within a 150 foot (45 m) wide by at least 150 feet (45 m) long FARA. The FARA is located at the far end of a 300 foot wide by 1,225 foot long (90 m by 373 m) FATO required for a precision instrument procedure. Figure 8-1 illustrates the FARA/FATO relationship.

**73. LIGHTING REQUIREMENTS.** The following lighting systems are necessary for a helicopter precision instrument approach procedure with the lowest minimums.

**a. HALS.** The HALS installation, depicted in figure 8-2, is a distinctive approach lighting configuration designed to prevent it from being mistaken for an airport runway approach lighting system.

**b. Enhanced Perimeter Lighting System.** The enhanced perimeter lighting system, as described in chapter 8, strengthens the conspicuity of the front and back line of perimeter edge lights.

**c. HILS.** The HILS system, described in chapter 8, uses PAR-56 lights to extend the line of edge lights fore and aft and right and left.

**NOTE:** *Figure 8-3 depicts the HILS and HALS precision instrument approach lighting system installation at the FAA's Demonstration Heliport, Atlantic City, New Jersey. The FAA is continuing its study of configurations for precision instrument approach lighting systems.*

**74. OBSTACLE EVALUATION SURFACES.** The operational minimums, determined by the FAA in establishing a helicopter precision approach procedure, depend upon the extent that objects or structures penetrate the surfaces described below and depicted in figure 8-4. The FAA needs to know the location and elevations of objects that penetrate the described surfaces to advise the heliport owner as to the lowest practical approach angle and prospective operational minimums. The heliport owner must then judge whether the operational benefits of the lower approach angles justify the costs to remove, lower, or mark and light objects and structures impacting the procedure.

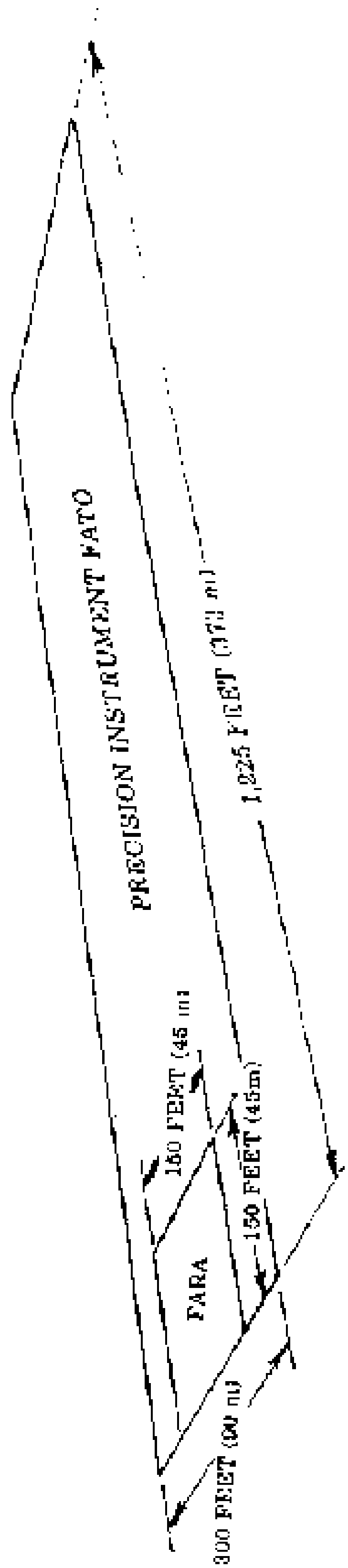
**a. Approach Surface.** A precision approach surface is a trapezoidally shaped plane beginning at the near edge of the instrument FATO. The trapezoid extending outward for 25,000 feet (7 500 m) in the direction of the approach has an initial width of 1,000 feet (300 m) and flares to a width of 6,000 feet (1 800 m) at the far end. The vertical slope ratio of 34:1 (horizontal to vertical) depicted in figure 8-4 is required for a 3-degree glide slope approach angle. A vertical slope ratio of 22.7:1 is required for a 4.5 degree glide slope approach angle. A vertical slope ratio of 17:1 is required for a 6 degree glide slope approach angle. The glide slope approach angle can vary in increments of 1/10 degree from 3 degrees up to 6 degrees with corresponding adjustments to the vertical slope ratio and landing minimums.

**b. Transitional Surfaces.** A precision instrument approach has transitional surfaces associated with the instrument FATO and the certified approach surface.

**(1) FATO.** Inner transitional surfaces abut each side, and when there is no back approach, the non- approach end of an instrument FATO. Transitional surfaces are 350 feet (105 m) wide and slope upward at right angles to the centerline of the instrument FATO at a ratio of 7:1 (horizontal to vertical).

**(2) Approach Surface.** Transitional surfaces abut each edge of the precision approach trapezoid. The surface is 600 feet (180 m) wide at the FATO end and flares to a width of 1,500 feet (450 m) at the far end of the approach trapezoid. Transitional surfaces slope upward at right angles to the centerline of the approach course at a ratio of 7:1 (horizontal to vertical).

**c. Missed Approach Surfaces.** The ability to support low landing minima, even when the approach trapezoid is void of penetrations, may be controlled by objects in the missed approach segment of the procedure. While figure 8-4 illustrates the initial portion of a missed approach surface, missed approach requirements are complex requiring specific technical advise outside the scope of this AC.




NOTE: THE ILLUSTRATED FARA-FATO RELATIONSHIP IS APPROPRIATE FOR A HELIPORT AT AN ELEVATION UP TO 1,000 FEET ABOVE MEAN SEA LEVEL

Figure 8-1. FARA/FATO relationship

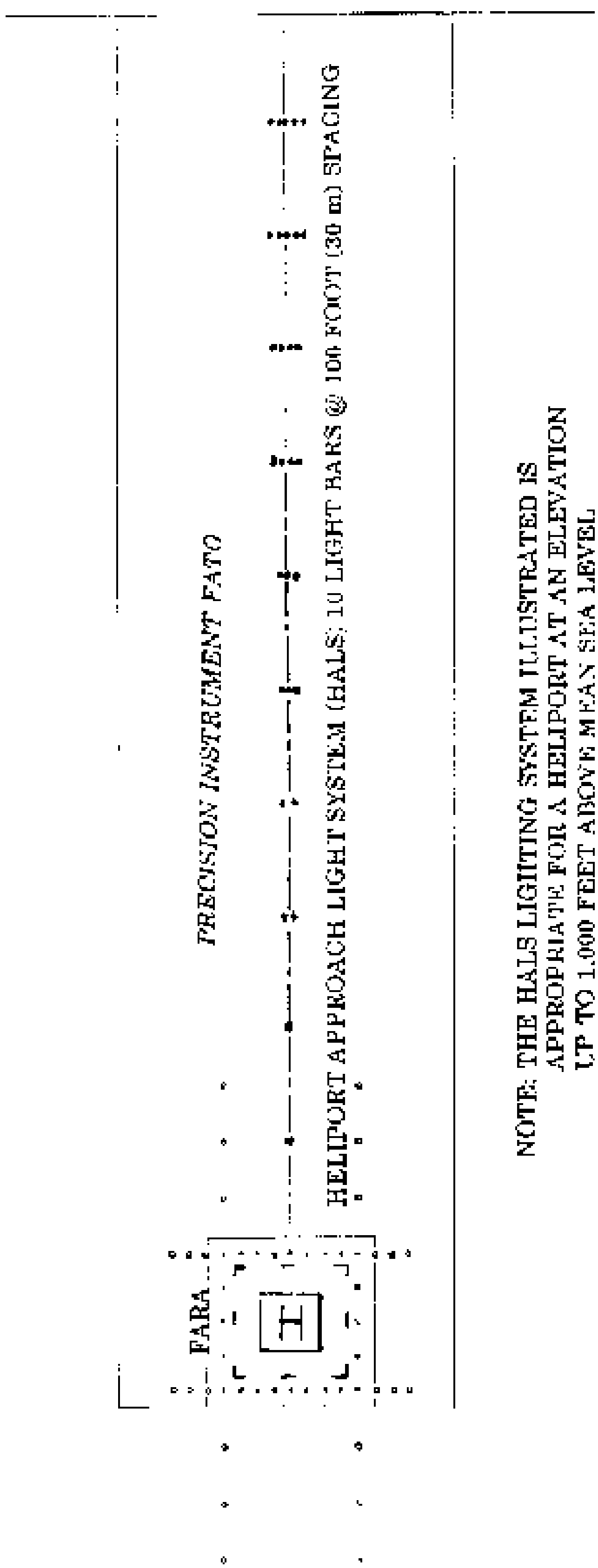



Figure 8-2. **HALS** lighting system.

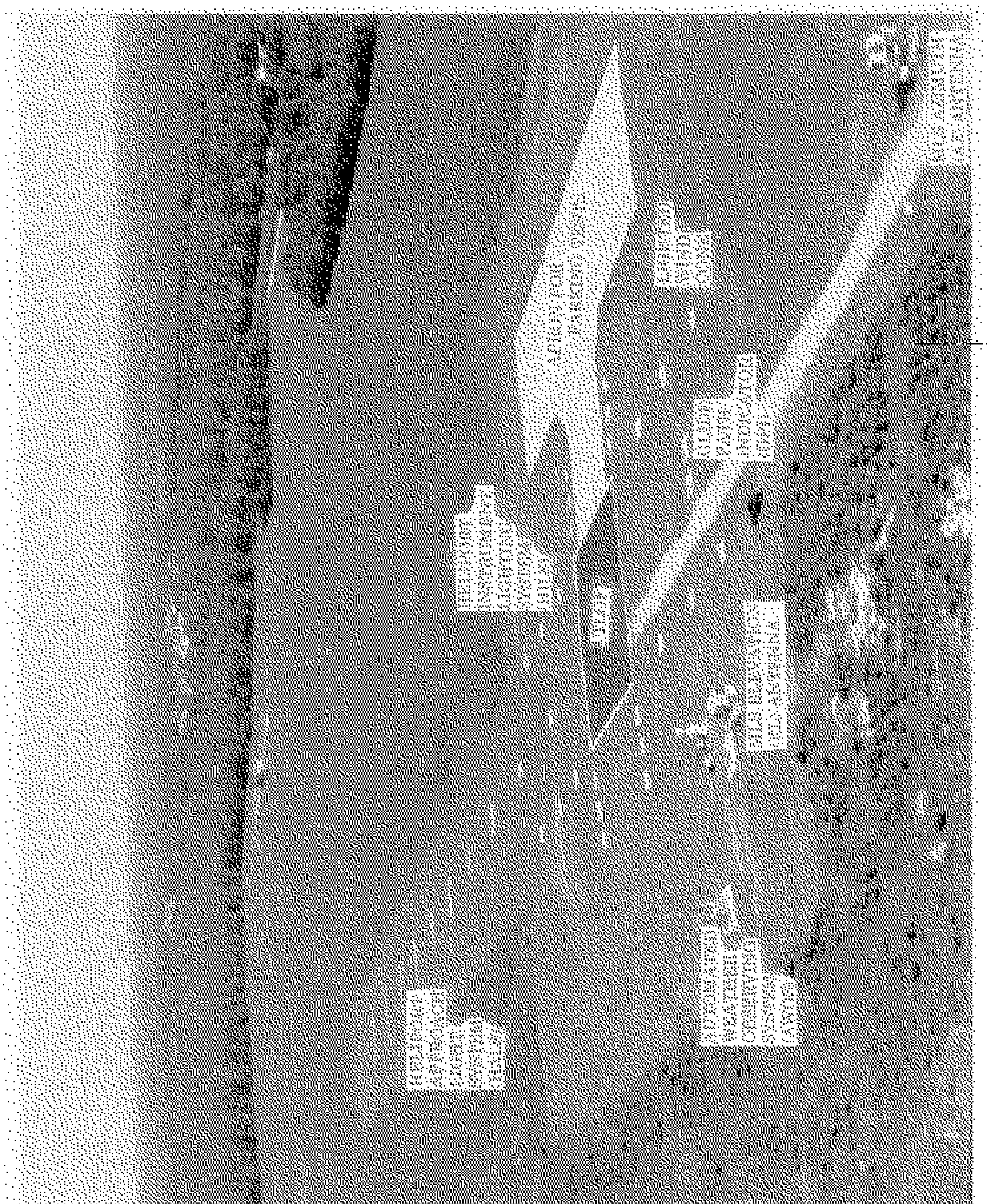


Figure 8-3. FAA Demonstration Heliport

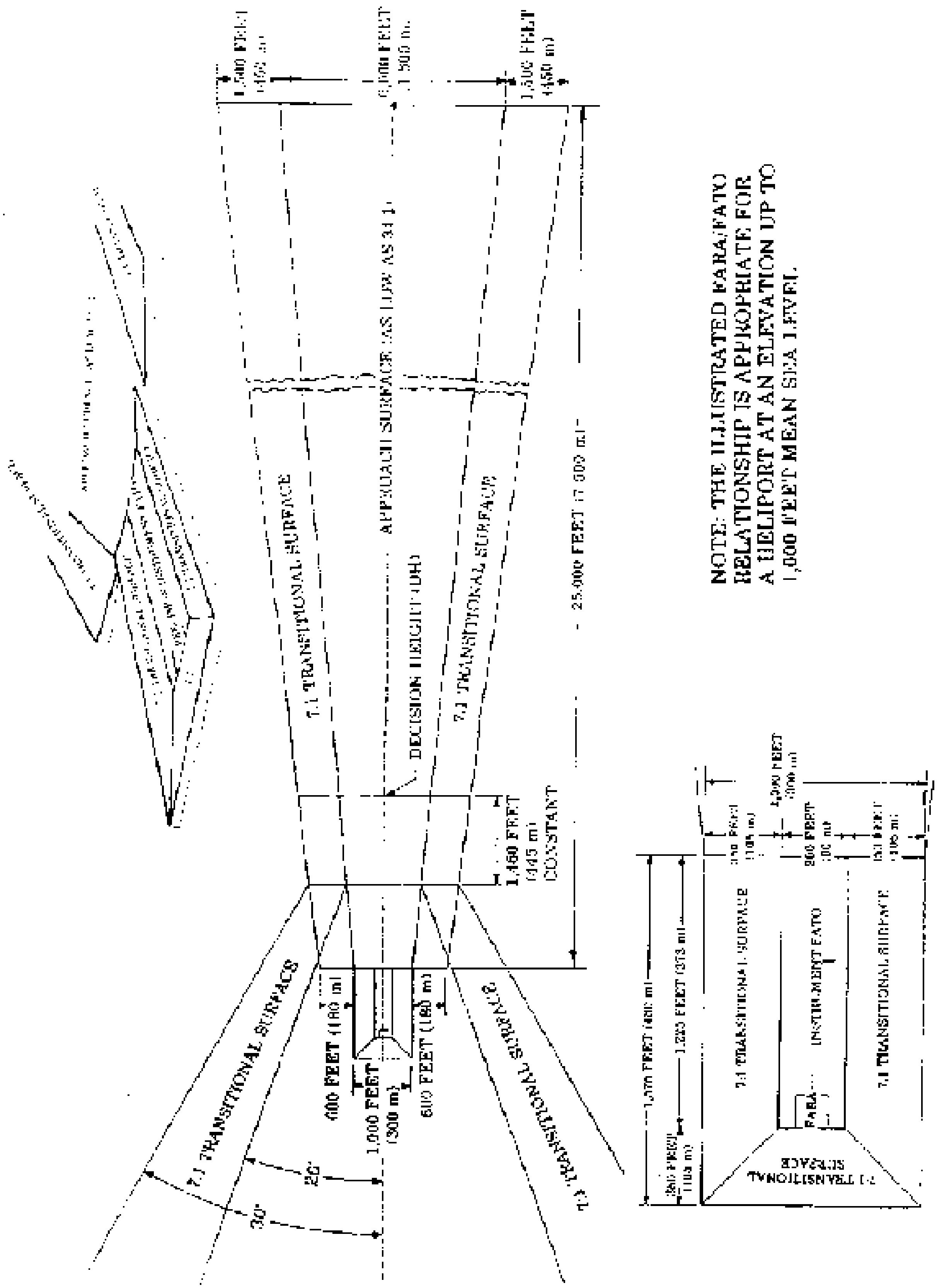



Figure 8-4. Obstacle evaluation surfaces

# CHAPTER 9. HELIPORT GRADIENTS AND PAVEMENT DESIGN

**75. GENERAL.** This chapter provides guidance on the designing heliport pavements, including design loads, and addresses soil stabilization as a method of treating non- paved operational surfaces.

**76. GRADIENTS.** Operational surfaces such as the FATO, TLOF, parking apron, taxi route, and taxiway should present a reasonably smooth, uniformly graded surface.

**a. Soft Surfaces.** The "soft" unpaved surfaces of a heliport should be graded to be free of surface irregularities and be designed to provide positive drainage. Longitudinal and transverse gradients of soft surfaces may range between a minimum of 2.0 to a maximum of 5.0 percent. A maximum gradient of 2.0 percent should be established for any soft surface on which the helicopter is expected to land.

**b. Hard Surfaces.** The "hard" surfaces of a heliport, whether paved or of metal or wood plank construction, should be designed to present a smooth surface and provide positive drainage. Longitudinal and transverse gradients of hard surfaces may range between a minimum of 0.5 to a maximum of 2.0 percent. Paved surfaces should be designed with a shoulder as illustrated in figure 9-1 to ensure that water is carried away from the pavement.

**77. DESIGN LOADS.** Heliport "hard" load bearing surfaces should be designed and constructed to support the weight of the design helicopter. Helicopter weights are listed in Appendix 1. Loads are applied through the contact area of the tires for wheel equipped helicopters or the contact area of the skid for skid equipped helicopters. Helicopter landing gear contact area configurations are illustrated in Figure 9-2.

**a. Static Loadings.** For design purposes, the design static load is equal to the helicopter's maximum takeoff weight applied through the total contact area of the wheels or skids.

**b. Dynamic Loadings.** A dynamic load of 1/5 second or less duration may occur during a hard landing. For design purposes, dynamic loadings may be assumed at 150 percent of the takeoff weight of the design helicopter. When specific loading data is not available, assume 75 percent of the weight of the design helicopter to be applied equally through the main landing gears of a wheel equipped helicopter, or through the aft contact areas (See figure 9-2) of a skid equipped helicopter.

**c. Rotor Loading.** Rotor (down wash) loadings are approximately equal to the weight of the helicopter distributed uniformly over the disk area of the rotor. Tests have established that rotor (down wash) loadings are generally less than the loadings specified in building codes for snow, rain, or wind loadings typically used in structural design calculations.

**78. PAVEMENT DESIGN AND SOIL STABILIZATION.** Pavements distribute the helicopters weight over a larger area of the subsurface as well as providing a water impervious, skid resistant wearing surface. Paving TLOFs, taxiways and parking aprons is encouraged to improve their load carrying ability, to minimize the erosive effects of rotor wash, and to facilitate surface runoff. Stabilizing unpaved portions of the FATO and taxi routes subjected to rotor wash is also encouraged. Guidance on pavement design and on stabilizing soils is contained in AC 150/5320-6, Airport Pavement Design and Evaluation, and AC 150/5370-10, Standards for Specifying Construction of Airports.

**a. Pavements.** In most instances, a 6 inch (15 cm) thick Portland Cement Concrete (PCC) pavement is capable of supporting operations by helicopters weighing up to 20,000 pounds (9 216 kg). Thicker pavements are generally not required unless heavier helicopters are expected, or the quality of the subsurface soil is questionable. PCC pavement is recommended for all heliport surfaces used by skid equipped helicopters.

**b. Stabilizing Soils.** Different methods of soil stabilization may be used to meet different site requirements.

**(1) Turf**. A dense well-drained turf is the least intrusive and most cost effective way to develop a usable landing surface capable of supporting the weight of many of the helicopters used by private and corporate operators. Climatic and soil conditions dictate the appropriate grass species to use at the site to provide protection against rotor induced erosion.

**(2) Aggregate-Turf.** The load carrying capability of poor soils may be improved by mixing selected granular materials such as crushed stone, pit-run gravel, coarse sand, oyster shell, etc. into the upper 12 inches (30 cm) of the soil. The ratio of aggregate to soil must be sufficient to improve the stability of the soil yet retain the soils ability to support grass.

**c. Formed Masonry Shapes.** Pre-cast masonry shapes vary in size and shape from a brick paver to an open block. Pavers can be laid on a prepared bed to present a solid surface. Pre-cast blocks can be embedded in the soil with grass growing in the natural openings. Architectural catalogs identify different masonry shapes that are commercially available for this purpose.

**d. Pierced Metal Panels.** Perforated metal panels, that allow grass to grow through the openings, can be laid on the ground to provide a hard surface for helicopter operations. Engineering catalogs identify commercially available panels.

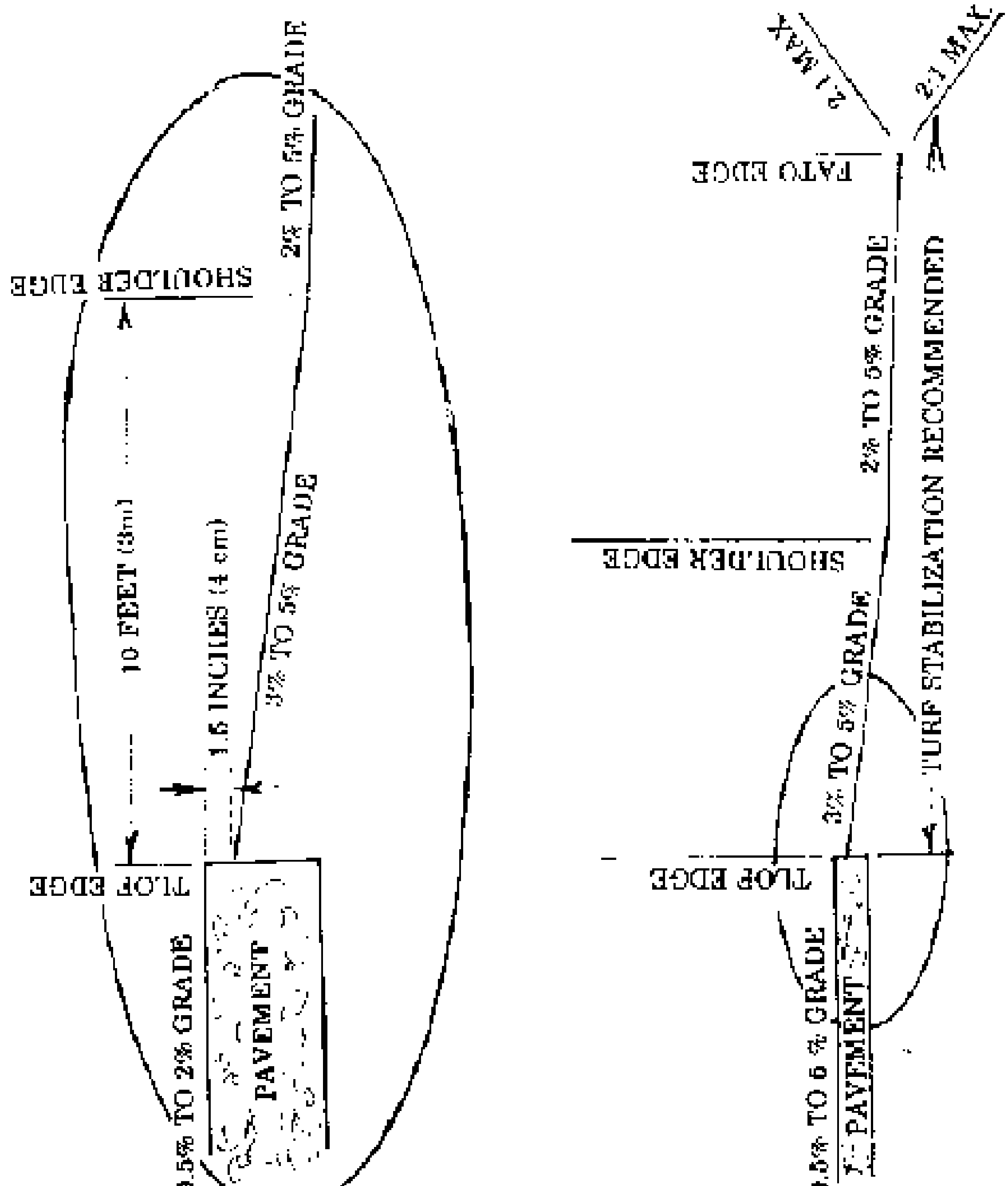
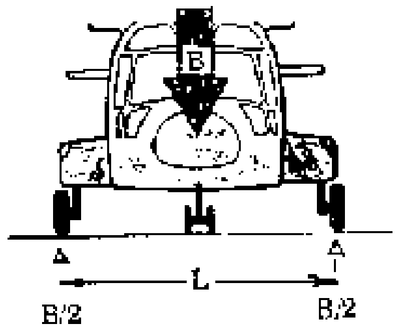
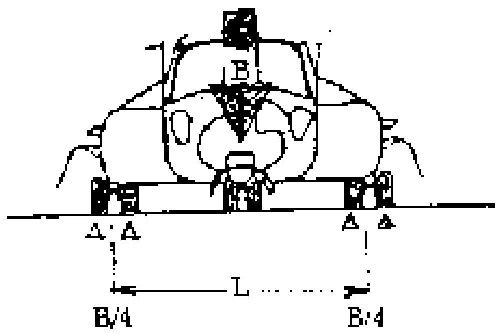



Figure 9-1. **Heliport grades and shoulder**

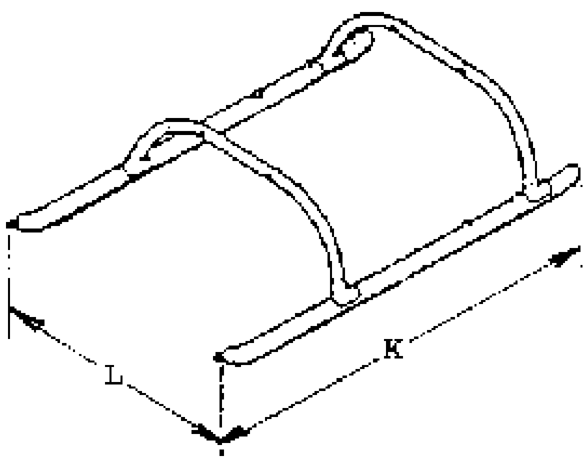



TYPICAL SINGLE WHEEL CONFIGURATION




TYPICAL DUAL WHEEL CONFIGURATION

B = GROSS WEIGHT
B/2 = GROSS WEIGHT/GEAR/SKID
B/4 = GROSS WEIGHT/TIRE
K = WHEEL BASE/SKID LENGTH
L = TREAD




TYPICAL SKID CONFIGURATION

Figure 9-2. Helicopter landing gear loading

# APPENDIX 1. HELICOPTER DATA

This appendix contains selected helicopter data needed by a heliport designer. The data represent the most critical weight, dimensional, or other data entry for that helicopter model recognizing that specific versions of the model may weigh less, be smaller in some feature, carry fewer passengers, etc.

The published information has been verified by the various helicopter manufacturers and is current as of the date of publication. If more specific data is needed the specific helicopter manufacturer should be contacted. Appendix X lists manufacturers' addresses.

A Manufacturer and helicopter model.

B Maximum takeoff weight in pounds.

C Overall length in feet. (Rotors at their maximum extension.)

D Overall height in feet. (Usually at tail rotor.)

E Rotor diameter in feet/no. of blades

F Rotor plane clearance in feet.

G Distance rotor hub to tail in feet.

H Tail rotor diameter (in feet). No Blades.

I Tail rotor ground clearance in feet.

J Gear pattern.

K Undercarriage length in feet. (Strut to strut.)

L Undercarriage width in feet. (The distance between tire or skid centers.)

M Number and type of engines.

N Number of crew and passengers.

O Standard fuel capacity in gallons.

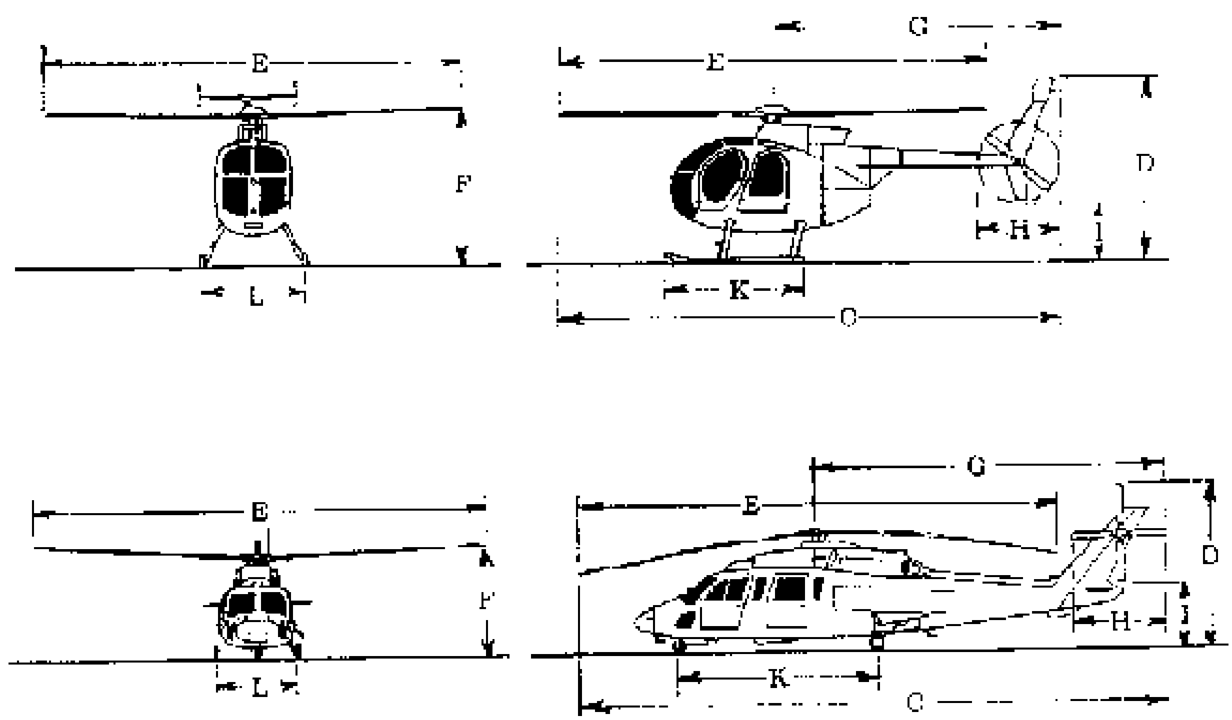



Figure A1-1. Helicopter dimensions

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | Maximum | | | Main Rotor | | | Tail Rotor | | | | | Number | | |
| 2 | Manufacturer | Takeoff | Overall | | Diameter | Ground | Hub to | Diameter | Ground | Undercarriage | | | Engines | Crew | Standard |
| 3 | Model | Weight | Length | Height | No. Blades | Clearance | Aft End | No. Blades | Clearance | Type | Length | Width | Type | Passengers | Fuel |
| 4 | | (Pounds) | (Feet) | (Feet) | (Feet/No.) | (Feet) | (Feet) | (Feet/No.) | (Feet) | | (Feet) | (Feet) | | No./No. | (Gallons) |
| 5 | | | | | | | | | | | | | | | |
| 6 | AMERICAN EUROCOPTER | | | | | | | | | | | | | | |
| 7 | 315 Lama | 4,300 | 43 | 11 | 37/3 | 10.1 | 24 | 6.3/3 | 3.2 | skid | 5.2 | 7.4 | 1-T | 1&4 | 152 |
| 8 | 330 Puma | 16,315 | 60 | 17 | 50/4 | 14.4 | 35 | 10.0/5 | 6.9 | [illegible] | 13.3 | 9.4 | 2-T | 2&21 | 408 |
| 9 | 332 Super Puma | 18,960 | 62 | 17 | 52/4 | 15 | 36 | 10.0/5 | 6.1 | [illegible] | 17.3 | 9.8 | 2-T | 2&23 | 535 |
| 10 | 341 Gazelle | 3,970 | 40 | 11 | 35/3 | 8.9 | 23 | Fenestron | 2.3 | skid | 6.4 | 6.6 | 1-T | 1&4 | 130 |
| 11 | 350 A Star/Ecureuil | 4,960 | 43 | 11 | 35/3 | 10.3 | 25 | 6.1/2 | 2.3 | skid | 4.7 | 7.1 | 1-T | 1&6 | 143 |
| 12 | 355 Twin Star | 5,600 | 43 | 11 | 35/3 | 10.7 | 25 | 6.1/2 | 2.3 | skid | 4.9 | 7.1 | 2-T | 1&6 | 193 |
| 13 | 360 Dauphin | 6,615 | 44 | 12 | 38/4 | 11.5 | 25 | Fenestron | na | [illegible] | 23.7 | 6.4 | 1-T | 1&13 | 169 |
| 14 | 365 Dauphin 2 | 9,369 | 45 | 14 | 40/4 | 11.4 | 24 | Fenestron | 2.6 | [illegible] | 11.9 | 6.7 | 2-T | 1&13 | 302 |
| 15 | BO-105 | 5,732 | 39 | 10 | 33/4 | 9.8 | 23 | 6.2/2 | 6.1 | skid | 8.3 | 8.3 | 2-T | 1&5 | 151 |
| 16 | BK 117 | 7,385 | 43 | 13 | 37/4 | 11 | 25 | 6.4/2 | 6.3 | skid | 6.2 | 8.2 | 2-T | 1&10 | 184 |
| 17 | | | | | | | | | | | | | | | |
| 18 | AUGUSTA | | | | | | | | | | | | | | |
| 19 | A 109 | 5,997 | 43 | 11 | 37/4 | 10 | 25 | 6.7/2 | 2.3 | [illegible] | 11.6 | 7.5 | 2-T | 1&7 | 185 |
| 20 | | | | | | | | | | | | | | | |
| 21 | BELL HELICOPTER | | | | | | | | | | | | | | |
| 22 | 47 | 2,950 | 44 | 10 | 36/2 | 9.5 | 25 | 5.1/2 | 3.5 | skid | 5.1 | 7.5 | 1-P | 1&3 | 58 |
| 23 | 205 | 9,500 | 58 | 15 | 48/2 | 11.8 | 31 | 8.5/2 | 5.9 | skid | 12.1 | 8.6 | 1-T | 1&14 | 215 |
| 24 | 206 Jet/Long Ranger | 4,450 | 43 | 10 | 37/2 | 9.5 | 25 | 5.4/2 | 1.5 | skid | 9.9 | 7.2 | 1-T | 1&6 | 110 |
| 25 | 212 | 11,200 | 58 | 13 | 49/2 | 13.4 | 34 | 8.5/2 | 4.3 | skid | 12.1 | 8.7 | 2-T | 1&14 | 215 |
| 26 | 214 | 17,500 | 63 | 16 | 52/2 | 14 | 37 | 9.7/2 | 3.5 | skid | 12.1 | 8.6 | 2-T | 2&16 | 435 |
| 27 | 230 | 8,400 | 51 | 12 | 42/2 | 12 | 30 | 6.9/2 | | | 12.2 | 9.1 | 2-T | 1&9 | 247 |
| 28 | 412 | 11,900 | 57 | 15 | 46/4 | 11 | 34 | 8.5/2 | 2.3 | skid | 7.9 | 8.3 | 2-T | 1&11 | 330 |
| 29 | | | | | | | | | | | | | | | |
| 30 | BRANTLY/HAYNES | | | | | | | | | | | | | | |
| 31 | B-2-B | 1,670 | 28 | 7 | 24/3 | 8 | 16 | 4.3/2 | 3 | skid | | 6.5 | 1-P | 1&1 | 31 |
| 32 | Model 305 | 2,900 | 33 | 8 | 29/3 | 8 | 19 | 4.3/2 | 3 | | 6.2 | 6.8 | 1-P | 1&4 | 43 |
| 33 | | | | | | | | | | | | | | | |
| 34 | BOEING | | | | | | | | | | | | | | |
| 35 | 107 | 20,000 | 84 | 17 | 50/3 | 15 | 59 | 50/3 | 16.9 | [illegible] | 24.9 | 12.9 | 2-T | 3&25 | 350 |
| 36 | 234 | 48,500 | 99 | 19 | 60/3 | 15 | 69 | 60/3 | 15.7 | [illegible] | 25.8 | 10.5 | 2-T | 3&44 | 2,100 |
| 37 | 360 | 30,160 | 84 | 20 | 50/4 | 14 | 59 | 50/4 | 19.6 | [illegible] | 32.7 | 13 | 2-T | 3&30 | 834 |
| 38 | | | | | | | | | | | | | | | |
| 39 | E.H. INDUSTRIES | | | | | | | | | | | | | | |
| 40 | EH-101 | 31,500 | 75 | 22 | 61.5 | 21.3 | 45 | 13.1/4 | 8.2 | [illegible] | 22.9 | 14.9 | 3-T | 3&30 | 805 |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | Maximum | | | Main Rotor | | | Tail Rotor | | | | | Number | | |
| 2 | Manufacturer | Takeoff | Over all | | Diameter | Ground | Hub to | Diameter | Ground | Undercarriage | | | Engines | Crew | Standard |
| 3 | Model | Weight | Length | Height | No. Blades | Clearance | Aft End | No. Blades | Clearance | Type | Length | Width | Type | Passengers | Fuel |
| 4 | | (Pounds) | (Feet) | (Feet) | (Feet/No.) | (Feet) | (Feet) | (Feet/No.) | (Feet) | | (Feet) | (Feet) | | No.&No. | (Gallons) |
| 5 | | | | | | | | | | | | | | | |
| 6 | ENSTROM | | | | | | | | | | | | | | |
| 7 | 280F/28F | 2,600 | 37 | 9 | 32/3 | 9.1 | 21 | 4.7/2 | 3.1 | skid | 3.1 | 7.3 | 1-P | 1&2 | 40 |
| 8 | 480 | 2,650 | 37 | 10 | 32/3 | 9.1 | 21 | 5.0/2 | | skid | | 6.1 | 1-T | 1&3 | 96 |
| 9 | | | | | | | | | | | | | | | |
| 10 | KAMAN | | | | | | | | | | | | | | |
| 11 | K-MAX | 6,000 | 51 | 21 | 2 48/2 | 10.7 | 28 | NA | NA | [illegible] | 15.3 | 11.3 | 1-T | 1 | 230 |
| 12 | | | | | | | | | | | | | | | |
| 13 | McDONNELL-DOUGLAS | | | | | | | | | | | | | | |
| 14 | 500/520/550 | 3,100 | 32 | 9 | 28/5 | 8.5 | 19 | 4.6/2 | | skid | 4.5 | 6.3 | 1-T | 1&4 | 65 |
| 15 | 520N/530N | 3,350 | 32 | 9 | 29/5 | 8.7 | 17 | NOTAR | | skid | 4.5 | 6.5 | 1-T | 1&4 | 65 |
| 16 | MDX Explorer | 5,800 | 39 | 12 | 34/5 | | 23 | NOTAR | 3.3 | skid | 7.3 | 7.3 | 2-T | 1&7 | 150 |
| 17 | | | | | | | | | | | | | | | |
| 18 | PIASECKI | | | | | | | | | | | | | | |
| 19 | PZL Sokol | 14,080 | 61.7 | 13.8 | 51.5/4 | | | 10.0/3 | | [illegible] | | | 2-T | 2&12 | |
| 20 | | | | | | | | | | | | | | | |
| 21 | ROBINSON | | | | | | | | | | | | | | |
| 22 | R-22 | 1,370 | 29 | 9 | 26/2 | 8.8 | 16 | 3.5/2 | | skid | 4.2 | 6.3 | 1-P | 1&1 | 20 |
| 23 | R-44 Astro | 2,400 | 38 | 11 | 33/2 | 10.5 | 22 | 4.8/2 | | skid | 4.2 | 7.2 | 1-P | 1&3 | 32 |
| 24 | | | | | | | | | | | | | | | |
| 25 | ROGERSON HILLER | | | | | | | | | | | | | | |
| 26 | RH-1100 | 3,500 | 42 | 10 | 36/2 | 9.5 | 24 | 6.0/2 | 5 | skid | 7.9 | 7.2 | 1-T | 1&6 | 69 |
| 27 | UH-12 | 3,100 | 41 | 11 | 36/2 | 10.1 | 23 | 6.0/2 | 4 | skid | 8.5 | 7.5 | 1-P | 1&2 | 46 |
| 28 | | | | | | | | | | | | | | | |
| 29 | SCHWEIZER | | | | | | | | | | | | | | |
| 30 | 269 | 1,670 | 29 | 9 | 26/3 | 8.8 | 15 | 3.8/2 | 3.8 | skid | 3.6 | 6.3 | 1-P | 1&1 | |
| 31 | 300 | 2,050 | 31 | 9 | 27/3 | 8.8 | 18 | 4.3/2 | 2.4 | skid | 8.5 | 6.5 | 1-P | 1&2 | 49 |
| 32 | 330 | 2,200 | 31 | 10 | 27/3 | 9.2 | 15 | 4.3/2 | 3.2 | skid | | 6.5 | 1-T | 1&3 | 60 |
| 33 | | | | | | | | | | | | | | | |
| 34 | SIKORSKY | | | | | | | | | | | | | | |
| 35 | S-58 | 13,000 | 66 | 16 | 56/4 | 11.4 | 38 | 9.5/4 | 6.4 | [illegible] | 28.3 | 17 | 2-T | 2&16 | 283 |
| 36 | S-61 | 20,500 | 73 | 19 | 62/5 | 17 | 42 | 10.6/5 | 8.3 | [illegible] | 23.5 | 14 | 2-T | 3&28 | 654 |
| 37 | S-64 Skycrane | 42,000 | 89 | 26 | 72/6 | 18.6 | 53 | 16.0/4 | 9.4 | [illegible] | 24.4 | 19.8 | 2-T | 3&0 | 1,320 |
| 38 | CH-53 | 69,750 | 100 | 29 | 79/7 | 17 | 61 | 20.0/4 | 9.5 | [illegible] | 27.3 | 13 | 3-T | 3&55 | 1026 |
| 39 | CH-60 Blackhawk | 22,000 | 65 | 18 | 54/4 | 12.3 | 38 | 11.0/4 | 6.5 | [illegible] | 29 | 8.9 | 2-T | 3&11 | 362 |
| 40 | S-76 | 11,700 | 53 | 15 | 44/4 | 10 | 31 | 8.0/4 | 6.5 | [illegible] | 16.4 | 8 | 2-T | 2&12 | 282 |
| 41 | | | | | | | | | | | | | | | |
| 42 | WESTLAND | | | | | | | | | | | | | | |
| 43 | 30-100-60 | 12,800 | 53 | 16 | 44/4 | 12.5 | 31 | 8.0/4 | 7.5 | [illegible] | 12.9 | 10.1 | 2-T | 2&19 | 348 |

# APPENDIX 2. MARKING DIMENSIONS

**1. PUBLIC USE HELIPORT.** The letter H, illustrated in figure A2-1, identifies a facility as a public use heliport. The H is centered in the TLOF or the intended landing position of an unpaved FATO and aligned with the preferred direction of approach. The recommended height of the H is the lesser of 0.8 times the TLOF length, 1.2 times the TLOF width, or 60 feet (18 m). The recommended width is 0.66 times the H's height. Width of vertical lines should be 0.07 times the H's height and width of the horizontal lines should be 0.14 times the H's height. When a black border is provided, it should be 0.02 times the H's height.

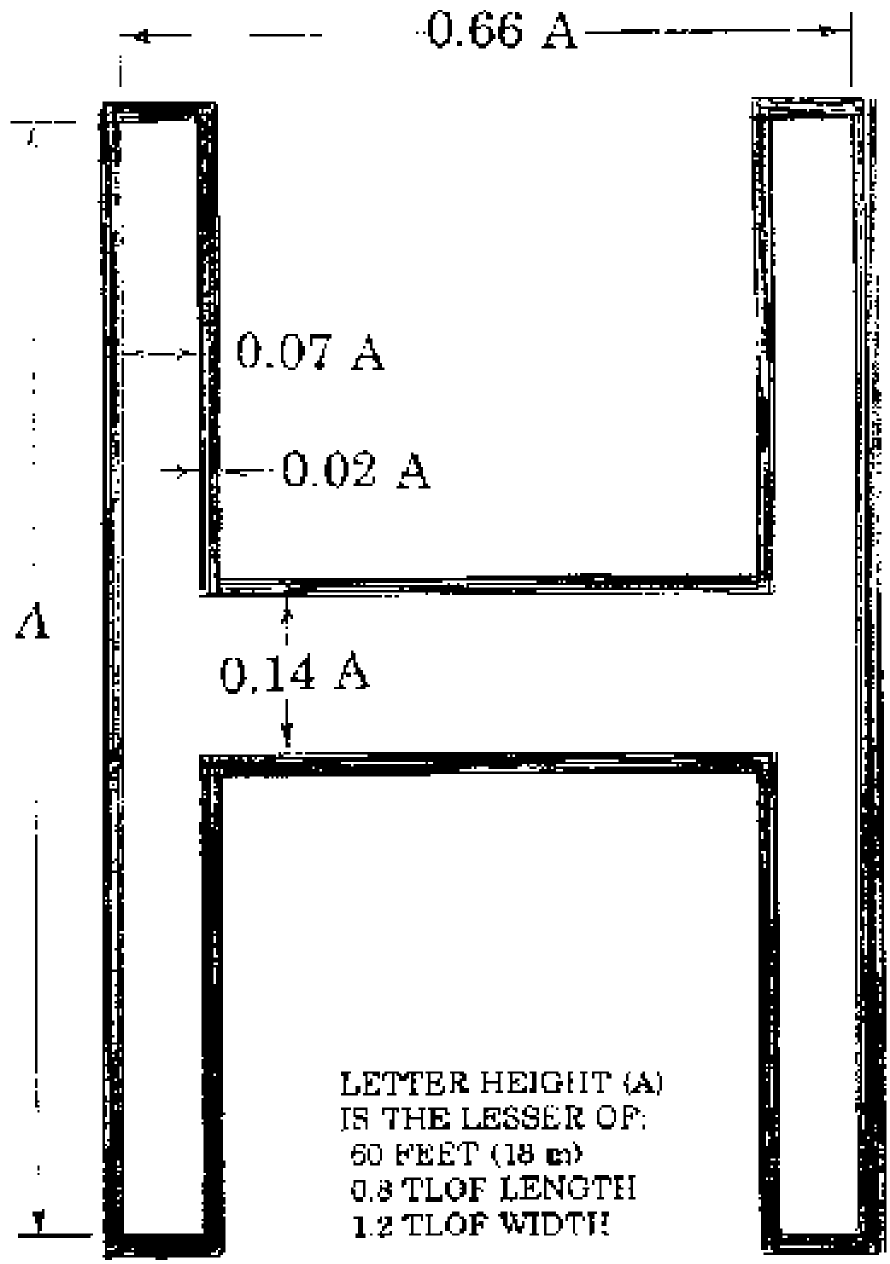



Figure A2-1. Standard heliport H marking

**2. HOSPITAL HELIPORT.** The cross marking identifying a hospital heliport is illustrated in figure A2-2. It is a configuration of 4 squares abutting on a center square. The recommended height and width of the cross is 0.8 times the TLOF's least dimension but not more than 30 feet (9 m). The red capital letter H, located in the center of the square, is the height of the center square with a width that is 0.66 the height of the center square. The width of vertical lines should be 0.1 times the H's height and the width of the horizontal lines should be 0.2 times the H's height. The cross may have a red border

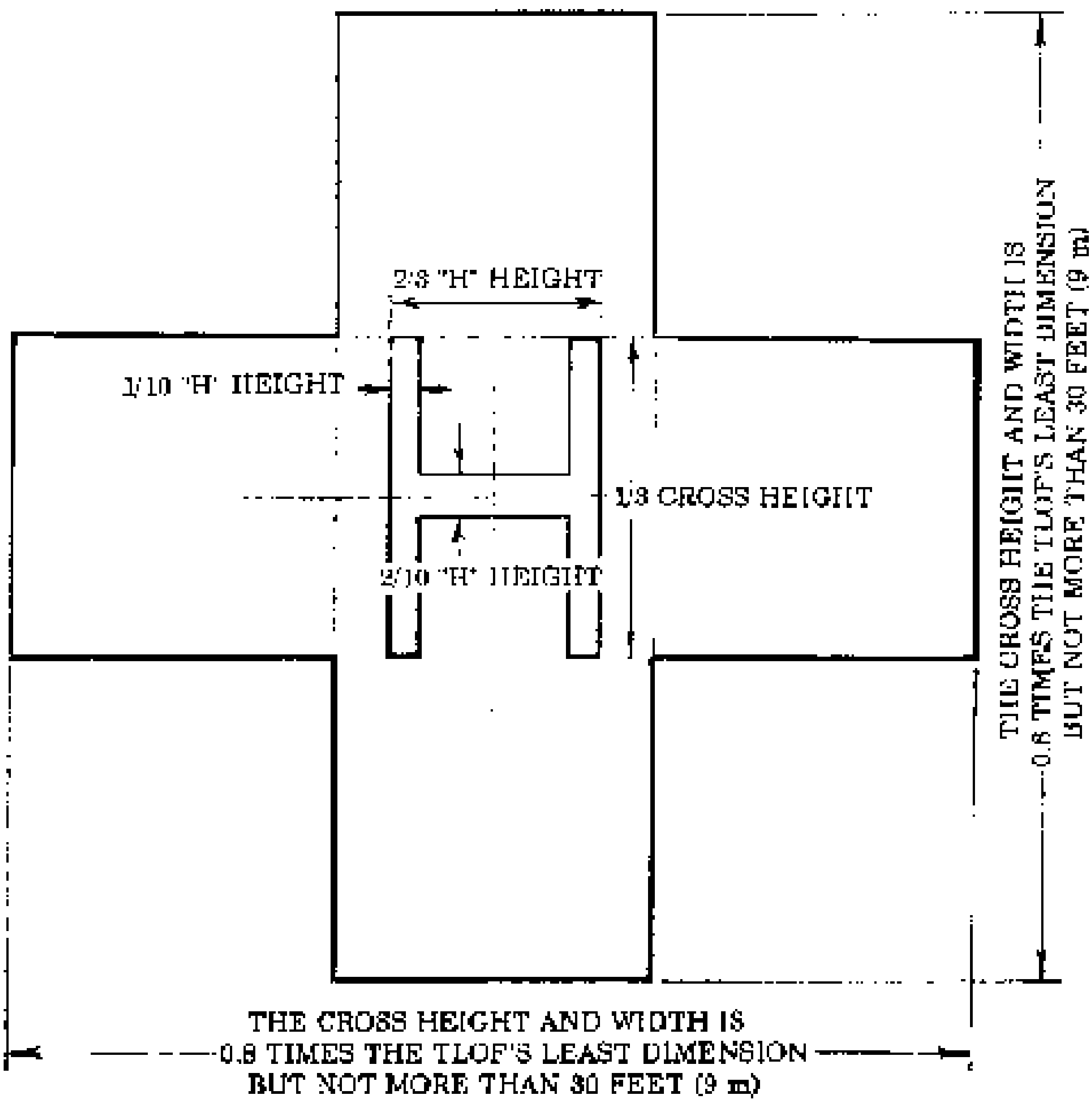



Figure A2-2. Hospital heliport marking

**3. OTHER.** A letter/numeral within a circle may be placed on/adjacent to the line at entry points to identify a parking position. When all positions are not able to accommodate the design helicopter, each position must be marked to indicate the largest rotor diameter that the position is capable of accommodating. This may be indicated by placing the position letter/number above the number of the design rotor diameter at each entry point to the position. Figure A2-3 illustrates the recommended marking.

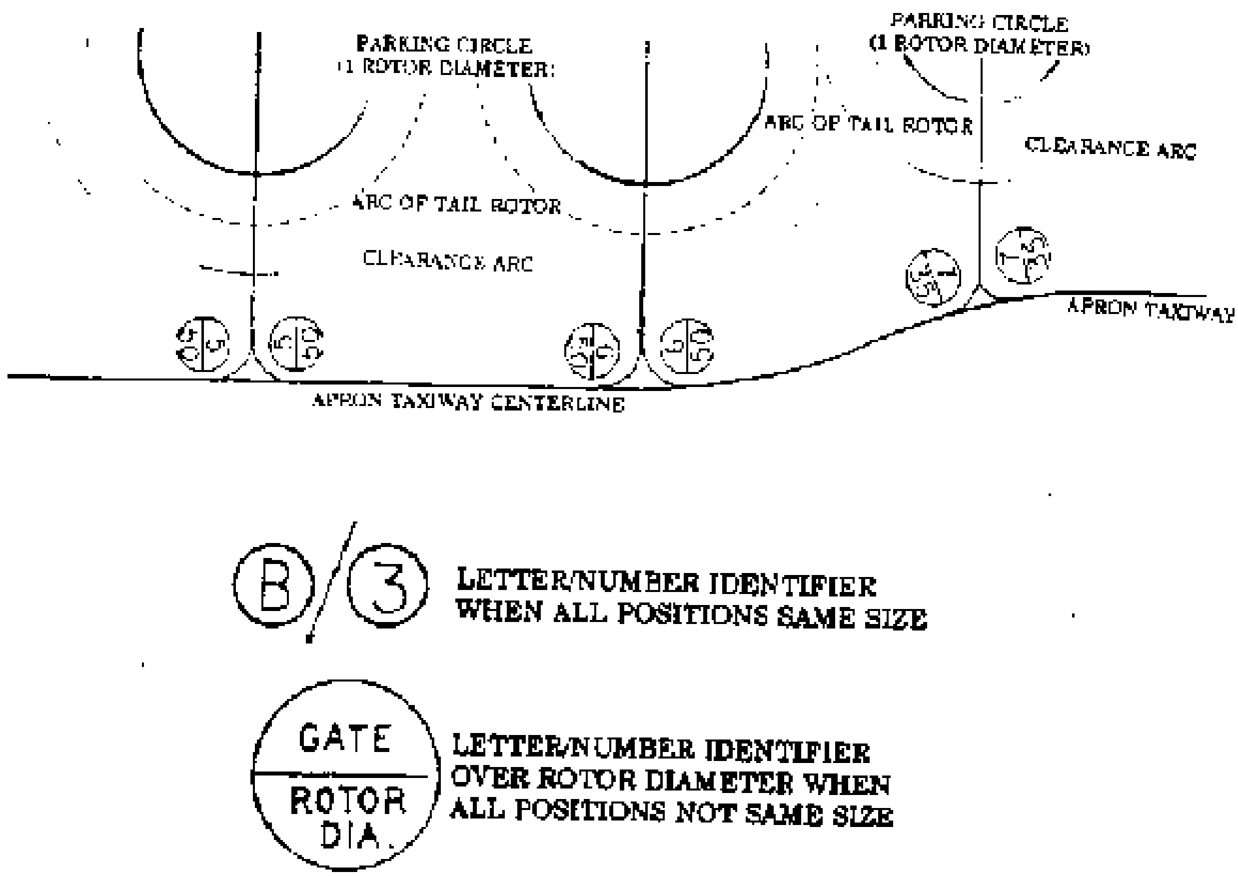



Figure A2-3. Other markings

# APPENDIX 3. AVIATION ORGANIZATIONS

## STATE AVIATION OFFICES

ALABAMA
Alabama Department Of Aeronautics
770 Washington Avenue, Suite 544
Montgomery, AL 36130
Telephone 205-242-4972
FAX 205-240-3274

ALASKA
Department of Transportation &
Public Facilities
P.O. Box 196900
Anchorage, AK 99519-6900
Telephone 907-266-1465
FAX 907-243-1512

ARIZONA
Division of Aeronautics
Arizona Department of Transportation
2612 South 46th Street
Phoenix, AZ 85034
Telephone 602-255-7691
FAX 602-255-7037

ARKANSAS
Department of Aeronautics
Regional Airport Terminal Building
No. 1 Airport Drive
Little Rock, AR 72202
Telephone 501-376-6781
FAX 501-378-0820

CALIFORNIA
Division of Aeronautics
California Department of Transportation
1130 K Street, 4th Floor
P.O. Box 942873
Sacramento, CA 94273-0001
Telephone 916-322-9965
FAX 916-327-9093

COLORADO
Division of Aeronautics
Colorado Department of Transportation
6848 South Revere Parkway, Suite 3-101
Englewood, CO 80112-6703
Telephone 303-397-3045
FAX 303-397-3042

CONNECTICUT
Bureau of Aviation and Ports
Connecticut Department of Transportation
24 Wolcott Hill Road
P.O. Drawer A
Wethersfield, CT 06129-0801
Telephone 203-566-3076
FAX 203-566-4904

DELAWARE
Aeronautics Administration
Delaware Transportation Authority
Department of Transportation
P.O. Box 778
Dover, DE 19903
Telephone 302-739-3264
FAX 302-739-5711

FLORIDA
Aviation Office
Florida Department of Transportation
605 Suwannee Street
Mail Stop 46
Tallahassee, FL 32399-0450
Telephone 904-488-8444
FAX 904-487-3403

GEORGIA
Georgia Department of Transportation
Office of Intermodal Programs
276 Memorial Drive, SW
Atlanta, GA 30303-3743
Telephone 404-651-9201
FAX 404-651-5209

HAWAII
Airports Division
Hawaii Department of Transportation
Honolulu International Airport
Honolulu, HI 96819-1898
Telephone 808-836-6542
FAX 808-836-6441

IDAHO
Bureau of Aeronautics
Idaho Department of Transportation
3483 Rickenbacker Street
P.O. Box 7129
Boise, ID 83705
Telephone 208-334-8786
FAX 208-334-8789

ILLINOIS
Division of Aeronautics
Department of Transportation
Capital Airport - One Langhorne Bond Dr.
Springfield, IL 62707-8415
Telephone 217-785-8544
FAX 217-785-4533

INDIANA
Division of Aeronautics
Indiana Department of Transportation
143 West Market Street, Suite 300
Indianapolis, IN 46204
Telephone 317-232-1496
FAX 317-232-1499

IOWA
Office of Aeronautics
Air and Transit Division
Iowa Department of Transportation
International Airport
Des Moines, IA 50321
Telephone 515-287-3315
FAX 515-287-7731

KANSAS
Division of Aviation
Kansas Department of Transportation
Docking State Office Building
915 SW Harrison
Topeka, KS 66612-1568
Telephone 913-296-2553
FAX 913-296-7927

KENTUCKY
Office of Aeronautics
Kentucky Transportation Cabinet
421 Ann Street
Frankfort, KY 40622
Telephone 502-564-4480
FAX 502-564-7953

LOUISIANA
Aviation Division
Department of Transportation & Development
P.O. Box 94245
Baton Rouge, LA 70804-9245
Telephone 504-379-1242
FAX 504-379-1394

MAINE
Air Transportation Division
Maine Department of Transportation
State House Station #16
Augusta, ME 04333
Telephone 207-289-3186
FAX 207-289-2805

MARYLAND
Maryland Aviation Administration
Maryland Department of Transportation
P.O. Box 8766
Baltimore/Washington Intl. Airport
MD 21240
Telephone 410-859-7100
FAX 410-850-4729

MASSACHUSETTS
Massachusetts Aeronautics Commission
10 Park Plaza, Room 6620
Boston, MA 02116-3966
Telephone 617-973-7350
FAX 617-973-7351

MICHIGAN
Bureau of Aeronautics
Department of Transportation
2nd Floor, Terminal Building
Capital City Airport
Lansing, MI 48906
Telephone 517-373-1834
FAX 517-886-0366

MINNESOTA
Aeronautics Office
Minnesota Department of Transportation
Transportation Building, Room 417
395 John Ireland Boulevard
St. Paul, MN 55155
Telephone 612-296-8202
FAX 612-297-5643

MISSISSIPPI
Mississippi Aeronautics Bureau
Department of Economic & Community Development
100 Airport Drive
Jackson, MS 39208
Telephone 601-354-6970
FAX 601-354-6969

MISSOURI
Department of Highways & Transportation
Aviation Section
P.O. Box 270
Jefferson City, MO 65102
Telephone 314-751-2589
FAX 314-751-6555

MONTANA
Aeronautics Division
Department of Transportation
P.O. Box 5178
Helena, MT 59604
Telephone 406-444-2506
FAX 406-444-2519

NEBRASKA
Nebraska Department of Aeronautics
P.O. Box 82088
Lincoln, NB 68501
Telephone 402-471-2371
FAX 402-471-2906

NEVADA
Nevada Department of Transportation
1263 South Stewart Street
Carson City, NV 89712
Telephone 702-687-5440
FAX 702-687-4846

NEW HAMPSHIRE
Division of Aeronautics
New Hampshire Department of Transportation
Municipal Airportú65 Airport Road
Concord, NH 03302-5298
Telephone 603-271-2551
FAX 603-271-1689

NEW JERSEY
Office of Aviation
New Jersey Department of Transportation
1035 Parkway Avenue CN 610
Trenton, NJ 08625
Telephone 609-530-2900
FAX 609-530-5719

NEW MEXICO
Aviation Division
State Highway and Transportation Department
P.O. Box 1149
Santa Fe, NM 87504-1149
Telephone 505-827-0332
FAX 505-827-0431

NEW YORK
Aviation Division
New York State Department of Transportation
1220 Washington Avenue
Albany, NY 12232
Telephone 518-457-2821
FAX 518-457-9779

NORTH CAROLINA
Division of Aviation
North Carolina Department of Transportation
P.O. Box 25201
Raleigh, NC 27611
Telephone 919-840-0112
FAX 919-840-0645

NORTH DAKOTA
North Dakota Aeronautics Commission
2301 University Drive
Box 5020
Bismarck, ND 58502
Telephone 701-224-2748
FAX 701-224-2780

OHIO
Ohio Department of Transportation
Division of Aviation
2829 West Dublin-Granville Road
Columbus, OH 43235
Telephone 614-793-5040
FAX 614 761-9609

OKLAHOMA
Oklahoma Aeronautics Commission
Department of Transportation Building
200 N.E. 21st Street, B-7 1st Floor
Oklahoma City OK 73105
Telephone 405-521-2377
FAX 405-521-2524

OREGON
Division of Aeronautics
Oregon Department of Transportation
3040 - 25th Street, S.E.
Salem, OR 97310
Telephone 503-378-4880
FAX 503-373-1688

PENNSYLVANIA
Bureau of Aviation
Pennsylvania Department of Transportation
208 Airport Drive
Harrisburg International Airport
Middletown, PA 17057
Telephone 717-948-3915
FAX 717-948-3527

PUERTO RICO
Puerto Rico Ports Authority
P.O. Box 362829
San Juan, PR 00936-2829
Telephone 809-723-2260
FAX 809-722-7867

RHODE ISLAND
Rhode Island Department of Transportation
Department of Airports
Theodore Francis Green State Airport
Warwick, RI 02886
Telephone 401-737-4000
FAX 401-732-4953

SOUTH CAROLINA
South Carolina Aeronautics Commission
P.O. Box 280068
Columbia, SC 29228-0068
Telephone 803-822-5400
FAX 803-822-8002

SOUTH DAKOTA
Office of Aeronautics
700 Broadway Avenue East
Pierre, SD 57501-2586
Telephone 605-773-3574
FAX 605-773-3921

TENNESSEE
Office of Aeronautics
Tennessee Department of Transportation
P.O. Box 17326
Nashville, TN 37217
Telephone 615-741-3208
FAX 615-741-4959

TEXAS
Texas Department of Transportation
Division of Aeronautics
P.O. Box 12607
Austin, TX 78711-2607
Telephone 512-476-9262
FAX 512-479-0294

UTAH
Aeronautical Operations Division
Utah Department of Transportation
135 North 2400 West
Salt Lake City, UT 84116
Telephone 801-533-5057
FAX 801-533-6048

VERMONT
Agency of Transportation
133 State Street
Montpelier, VT 05633
Telephone 802-828-2093
FAX 802-828-2829

VIRGINIA
Department of Aviation
4508 S. Laburnum Avenue
Richmond, VA 23231-2422
Telephone 804-786-1364
FAX 804-786-3690

WASHINGTON
Division of Aeronautics
Washington Department of Transportation
8600 Perimeter Road-Boeing Field
Seattle, WA 98108-3885
Telephone 206-764-4131
FAX 206-764-4001

WEST VIRGINIA
Department of Transportation
Building 5, Room A-109
West Virginia State Capital
Charleston, WV 25305
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FAX 304-348-4076

WISCONSIN
Bureau of Aeronautics
Division of Transportation Assistance
Wisconsin Department of Transportation
P.O. Box 7914
Madison, WI 53707-7914
Telephone 608-266-3351
FAX 608-267-6748

WYOMING
Wyoming Department of Transportation
5300 Bishop Boulevard
P.O. box 1708
Cheyenne, WY 82002-9019
Telephone 307-777-4480
FAX 307-637-7352

## Aviation Organization/Associations

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421 King Street, Suite 220
Alexandria, VA 22314
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FAX 703-549-4749

AMERICAN HELICOPTER SOCIETY
217 N. Washington St.
Alexandria, VA 22314
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FAX 703-739-9279

ASSOCIATION OF AIR MEDICAL SERVICES
35 S. Raymond Avenue, Suite 205
Pasadena, CA 91105
Telephone 818-793-1232
FAX 818-793-1039

HELICOPTER ASSOCIATION INTERNATIONAL
1619 Duke Street
Alexandria, VA 22314-3406
Telephone 703 683-4646
FAX 703-683-4745

HELICOPTER SAFETY ADVISORY CONFERENCE
c/o Exxon USA-Offshore Division
P.O. Box 60626
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FAX 504-561-4808

NATIONAL ASSOCIATION OF STATE AVIATION OFFICIALS
Metro Plaza One-Suite 505
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Silver Spring, MD 20910
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FAX 301-588-1288

NATIONAL BUSINESS AIRCRAFT ASSOCIATION
1200 18th Street, Northwest, Suite 200
Washington, D.C. 20036
Telephone 202-783-9000
FAX 202-331-8364

NATIONAL EMS PILOTS ASSOCIATION
35 South Raymond Avenue, No. 205
Pasadena, CA 91105
Telephone 818-577-7600
FAX 818-793-1039

# FEDERAL AVIATION ADMINISTRATION
# AIRPORTS DIVISION OFFICES

ALASKAN REGION
Alaskan Regional Office
AK
Airports Division, AAL-600
222 West 7th Avenue, Box 14
Anchorage, AK 99513
Telephone 907-271-5438
FAX 907-271-2851

NEW ENGLAND REGION
CT, MA, ME, NH, RI, VT
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Burlington, MA 01803-5299
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College Park, Georgia 30337
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FAX 404-305-6730

GREAT LAKES REGION
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Airports Division, AGL-600
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Des Plaines, IL 60018
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FAX 708-294-7036

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Kansas City, MO 64106
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FAX 816-426-3265

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AR, LA, NM, OK, TX
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Airports Division, ASW-600
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Fort Worth, Texas 76173-4298
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FAX 817-22-5984

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Northwest Regional Office
Airports Division, ANM-600
1601 Lind Avenue SW, Suite 540
Renton, Washington 98055-4056
Telephone 206-227-2600
FAX 206-227-1600

WESTERN-PACIFIC REGION
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Western-Pacific Regional Office
Airports Division, AWP-600
15000 Aviation Boulevard
Hawthorne, CA 920261
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FAX 310-297-0490